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# *FRONTISPIECE.*

*The Utility of Storms.*—VOL. II. p. 208.

# REFLECTIONS

ON THE

# WORKS

AND

# PROVIDENCE OF GOD

THROUGHOUT ALL NATURE,

For every Day in the Year.

TRANSLATED FROM THE GERMAN OF C. C. STURM.

A NEW EDITION,

Carefully Revised and Improved,

BY THE REV. T. SMITH.

IN THREE VOLUMES.

VOL. II.

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# REFLECTIONS

ON THE

# WORKS OF GOD.

*Hymn on the Beauties of Spring.*

BLESSED children of God! open your hearts to joy! contemplate the bounteous gifts and gay attire of spring: behold the rich verdure of the fields, and gaze on the flowery meadows, whose fruits will shortly present you with the sweets of abundance.

Yonder tree, which, a little time ago, seemed destitute of sap and life, is now covered with blossoms that promise an ample produce. How beautiful is Nature! How graceful her ornaments!

In this charming season, every meadow, wood, and field exhibit the most cheerful aspect, and, together with men and animals, seem to rejoice in a new existence. The lark soars aloft till his melodious carols seem lost in the fleecy clouds; the pigeon quits her winter retreat, to fly round the enamelled plain; and the sweetly plaintive notes of the nightingale pour from the umbrageous groves, and vocalize the adjacent hills and valleys. The swallow flies abroad in quest of sustenance, but hastily returns to her nest, the dear repository of her expecting offspring; while

the domestic hen guides, protects, and shelters with her expanded wings, the tender little ones which nature has intrusted to her maternal care.

The corn shoots up in abundance, while the industrious husbandman and his children anticipate the blessings of the future harvest.—Men plant, but the vivifying rays and fertilizing showers descend from heaven. The heat of the sun matures the fruits of the earth, and causes the animating juice to flow from the vine. Thus the most abject among the sons of men, when animated with celestial life, becomes an honour to humanity, and a herald of the glory of God.

Almighty and adorable Being! whilst I contemplate thy divine goodness, as evinced in all the circumstances of the present life, may I be enabled to anticipate that future and supreme felicity which thou hast reserved for all who repose their confidence entirely upon thee!

## MAY 1.

### *The System of the World.*

Of all the constituent parts of the mundane system, the sun is, indisputably, the most interesting. His form is spherical; he seems to be composed of an igneous but inconsumable matter, and, by the aid of a telescope, certain spots are discoverable, which prove that he revolves round his axis. His distance from the earth is upwards of

ninety-five millions of miles, and he is a million of times larger. He communicates his light to at least twenty opaque globes, which revolve around him at different distances, and are called *planets.* The nearest to him is Mercury, who, being almost buried in the solar rays, is seldom seen, and little known. Next is Venus, who is called *Lucifer,* or the morning star, and *Hesperus,* or the evening star, because she sometimes precedes the sun, and sometimes follows after him. Next to Venus comes our globe; the external surface of which is composed of land and water, mountains and valleys; and the interior part consists of beds or strata of different substances. This earth is the abode of a multitude of creatures, both animate and inanimate, plants, metals, and minerals. The moon turns in a particular orbit round our globe, and accompanies it in the whole circle it describes round the sun. She is about fifty times smaller than the earth, and on her surface we discover a variety of spots, some lucid and brilliant, others obscure and gloomy; the first supposed to be continents, and the others seas or deep valleys. If the moon were composed only of one substance, if she were a body entirely solid, or entirely fluid, she would reflect the rays of the sun all the same way, and we should not see those spots which are now discernible in her. A fluid body, such as water, absorbs a great number of rays, and only reflects a few: it is, therefore, very apparent that the dark parts of the moon are seas, which absorb the rays of light; or deep valleys, into which the rays are precluded from

falling by the mountains; and that the luminous parts are land. Amongst these lucid parts, some are more brilliant than others, and even cast a shadow. They must therefore be higher than others, and resemble our mountains. Some of these mountains seem unconnected; others are contiguous, and form very long chains.

The four last planets of our system are, Mars; Jupiter, with his four moons, or satellites; Saturn, with seven; and the Georgium Sidus, with six moons. Saturn is at such an immense distance from the sun, that he is nearly thirty years in performing his revolution. This vast dominion of the sun, however, which, taking in Saturn only, extends to more than nine hundred millions of miles, is but a *part* of the universe: for each of the fixed stars, the number of which is, perhaps, more than the grains of sand on the sea-shore, may be considered as a sun, which, if it do not surpass ours, at least equals it in size and splendor, and its influence may probably extend still farther.

Thus we perceive the wonderful greatness of God! and thus the heavens declare the glory of the Lord! Is there any thing in nature more proper to inspire us with sublime ideas of the Deity, than the sight of the celestial vault? Can we ever raise our eyes to heaven, without feeling the most lively sense of the magnificence and greatness of Him, who gave being to all things, and who governs them with incomprehensible power, wisdom, and goodness? What are *we*, poor miserable mortals, who crawl like insects on a grain of sand, and are lost in the immensity of the cre-

ation! What are *we*, in comparison of those innumerable systems, which contain so many vast globes within their circle! What are *we*, especially in comparison of the *Creator* of all those worlds, suns, and skies, which, if we attempt to measure, trouble and confound the understanding! And yet this sovereign Ruler of the immense universe deigns to honour *us* with his protection and paternal care. How adorable are his mercies! Let us prostrate ourselves at his footstool, and praise him in the firmament of his power.

## MAY II.

### *Reflections on the Blossoms of Trees.*

At this instant, in which our gardens and fields are adorned with all the ornaments of spring, all Europe appears with equal pomp, and every where presents the most cheerful aspect. The eternal word of the Creator, pronounced when he formed the world, has produced all these magnificent effects. One hand alone, that of the Creator and Sovereign of the world, has, in a few days, renewed the earth, and in a measure created it anew, for the use and pleasure of his intelligent creatures. It is God alone who calls forth the spring and orders it to appear. Approach, O mortal! and try what thy wisdom and power can effect. Art thou able to make a single tree blossom? to call from the earth the smallest blade of grass? to order a single tulip to appear in all its

splendor? Approach, ye learned artists, ye skilful painters, and contemplate these flowers; examine these master-pieces with the most scrupulous attention. Is any thing wanting to their perfection? Can you discern any fault in their forms, their proportions, or the blending of their colours? Can your pencil express the lustre of the blossoming peach, or imitate the elegant tints of the cherry-tree in bloom? So far from *imitating*, you are unable to *conceive* all the magnificence of renovated nature. If there were no other proofs upon earth of the power and wisdom of God, the flowers of spring alone would be sufficient to convince us of it. His power evidently appears throughout the whole. Each tree that blossoms, each herb and flower, proclaim that goodness and wisdom which is so abundantly diffused over all the earth. We remark an infinite variety in the blossoms of trees: all are beautiful, but their beauties are different. One surpasses another, but there are none which do not possess some beauty peculiar to themselves. However great the Creator may be in dispensing his gifts, he still reserves to himself the liberty of bestowing more on some than others. But this difference is only in respect to accessary qualities. Such a tree, for example, has blossoms of a dazzling white; another has red stripes and shades; while others add to their beauty the most exquisite perfume. But all these differences are only accidental, and do not in the least affect their fertility. From the contemplation of these circumstances, we may derive profit and instruction.

We may consider that though the Almighty deny to *us* those advantages which some of our fellow-creatures possess, it does not become us to be either afflicted or discouraged; for the loss of some accidental beauties, of whatever nature they may be, cannot prove injurious to our real welfare. If we be not as opulent, as well formed, or as highly respected as others, we may, nevertheless, be as happy, as virtuous, as pleasing to God, and as useful to man. Provided we bear the fruits of piety and righteousness, we possess true beauty. Why do the blossoms of a tree please us more than the rich colours of a tulip, an auricula, or a ranunculus? It is because the pleasure we receive from viewing the latter is of short duration; whereas the others give us hope of delicious fruit. Let us not, therefore, confine our wishes to the exterior charms of a beautiful flower. The bloom of health, the graces of symmetry, and other outward advantages of nature, are not the things which afford durable and permanent pleasures. The blossoms which promise fruit agreeable to God, are what truly merit our esteem; and these are they which will never fade.

Iti s a melancholy thing to consider, that all those dazzling beauties we now admire in the blossoms on the trees, will disappear in a few days: and yet such will be the fate of all those blooming youths, who are now so vain of their charms. Let this thought ever attend us in the solitary walks we take in our gardens: and let it be our principal study to act in such a manner, that, when the external charms of the body are

no more, we may supply their place with abundant fruits of virtue and piety.

A tree which has been covered with beautiful blossoms, but which disappoints our expectation of fruit, and only serves to injure the growth of the plants around it, is regarded with indifference, if not with contempt. And it is truly melancholy to see a person, who, in the spring of youth, was adorned with all the charms of person and the gifts of fortune, not only bearing no fruit in the summer or autumn of life, but becoming a hindrance to the fruitfulness of others. Should we arrive at that period when God and our fellow-creatures have a right to expect much fruit, may every blossom of youth prove productive of exemplary piety. Then shall we enjoy the approbation of our fellow-creatures, and receive the benediction of our heavenly Father.

## MAY III.

*Continual Revolutions and Changes in the Earth.*

CHANGE and motion seem absolutely necessary to the preservation of the corporeal world. Not a particle of matter in the universe can be considered perfectly at rest, as the slightest attention to what passes on our globe will suffice to demonstrate.

The earth turns round its axis every twenty-four hours; and, by this motion, all the points of its surface (except the poles), change place with

more or less rapidity. Under the line or equator, where this motion is the swiftest, every thing passes through more than one thousand miles an hour, though it does not change its situation on the surface. But, besides this, the earth makes its annual revolution round the sun, with so much velocity, that, according to the most moderate calculations, it goes through fifty-eight thousand miles every hour, though its course is not perceptible. The relative motion of earthly bodies is more observable. Little rivulets unite, and form greater: these, in their turn, form torrents and rivers; which are afterwards lost in the sea. Water is also raised in exhalations, and forms clouds, which produce rain, snow, and fogs: these form streams, which return into the sea; and tides, storms, and torrents, keep the water in continual motion.

The atmosphere, likewise, is in continual motion. An east wind blows incessantly between the tropics; and, though in other places the motion is not always perceptible, yet the barometer and thermometer prove that the air is not perfectly calm, and the frequency of meteors, of different kinds, sufficiently demonstrate that nature is never at rest. The surface of the earth is also subject to frequent revolutions: the hardest rocks split; stones gradually wear away; lands fall in, or are overflowed; certain grounds rise, and others are overturned by earthquakes; little hills are washed away by the waters; valleys are filled up; marshes become dry, and are covered with trees; and the bottom of the sea becomes firm

ground. Light and darkness, cold and heat, drought and wet, succeed each other by turns. Lastly, the continual variation of heat occasions, every hour, changes in different parts of bodies, though often imperceptible. If we add to this the changes visible in animals, we may have some idea of the continual revolutions to which every thing here is subject. It is said, that man loses about two ounces and a half daily by perspiration. This is replaced by other particles; so that, at the end of ten years, a man's body is entirely changed. All animals and plants are nourished, grow, propagate, die, and corrupt.

Thus, every thing on our earth is in motion; every thing grows and perishes by turns. In a word, to be *born*, and to *die*, is the sum of all that passes on the theatre of the world. But this does not happen, as at first sight might be imagined, accidentally, or by chance, without order or design. Every thing acts according to certain laws, which tend to certain ends. Every thing combines, every thing concurs, in the most perfect manner, to the glory of the Creator. All contributes to, and terminates in, the happiness of the universe.

These continual revolutions are useful warnings to us, as they teach us that this present world cannot be our place of final destination. When we consider the continual vicissitudes which all on earth must undergo, is it not a most affecting lesson, on the vanity of all terrestrial things, on the uncertainty and shortness of life, on the necessity of a better and permanent state in the world to come? Yes, every thing points

out our true destination, and loudly proclaims that we are but strangers and pilgrims on the earth.

What a consolation is it in the midst of the revolutions of the world to lift up our eyes to God, who is both immutable and eternal! Let the mountains be shaken, and fall down; let the sea be troubled, and the waves roar; let all earthly bodies be destroyed, and return to their primeval dust; still He is, and ever must be, invariably the same.

The time allotted to me as a spectator of these revolutions may probably be very short. Should this be the case, vouchsafe, indulgent God, to receive me into those blissful regions where there shall be no vicissitudes of day and night, nor any variation of the seasons. Then I shall enjoy the light of thy countenance, and contemplate thy glories, in perfect and uninterrupted felicity.

## MAY IV.

*An Invitation to seek God in the Works of Nature.*

Awake, O my soul! awake from the slumber in which thou hast been so long immersed, and regard with attention the objects which surround thee. Consider thyself and all other creatures. Reflect on their origin, construction, form, utility, and a thousand other circumstances, which must fill every attentive observer of the works of God with admiration. When thou seest the brilliant

and variegated colours of the sky, the lustre of the numerous stars which irradiate it, and the rays of light reflecting from a thousand interesting objects, ask thyself, whence all these proceed? who formed that immense expanse of heavens? who placed in the sky those innumerable fires; those stars, which, though at so prodigious a distance, dart their rays even unto us? who ordered the planets to move with so much regularity, and the sun to enlighten and fertilize the earth? Was it not our adorable Creator? Yes, it was his powerful word which called all these objects out of nothing, and wisely ordained them to continue in existence! How stupendous the greatness, how incomprehensible the power which formed all these things! and how infinite the goodness which arranged the whole in such a manner as to be most conducive to our felicity!

Ye lofty mountains! what powerful hand established your firm foundations, and elevated your summits above the clouds? Who adorned your sides with groves and forests, and beautified them with flowers and verdure? Who covered your heads with a mantle of eternal snow? And who drew from your bosoms those springs and rivers which moisten and enrich the earth? It was the hand of Jehovah which wrought all these wonders; and that divine hand I desire to adore, with sentiments of admiration, respect, and gratitude.

Flowers of the field! who gave you your magnificent clothing? how happens it that you are produced out of a little earth and a few drops of water? whence have you that variety of perfumes

which embalms the air and delights our senses; those vivid colours which charm our sight, and which no human art can imitate? This is thy work, O Lord! every thing on the earth proceeds from thee.

And you, O animated beings, which people the air, the waters, and the land! to whom do you owe your existence, your construction, and those various and wonderful instincts which astonish our reason, and are so well adapted to your different modes of life?

But, what a multitude of wonders may I observe in myself! How does a handful of dust become a body, well organized? How is it that one of its parts has sight; that another, by means of the undulation of air, is informed of the thoughts of people; and that a third tastes the different flavours of food? How is it that I have the faculty of communicating my ideas and desires? How does a little matter bruised by my teeth afford me so many agreeable sensations? I acknowledge the hand of my Creator in all these incomprehensible wonders. His wisdom, power, and goodness, all combine to render me happy.

Infinite God! may it be my most highly prized duty to contemplate and acknowledge thee in all thy works; since every object in the heavens and upon the earth, leads to thee, or serves as a memento of thy power, wisdom, and goodness. The best use I can make of these charming days of spring, is, in the midst of the revolutions which are now taking place in the earth, to lift my eyes to thee, who, in every season, openest thy liberal

hand, and satisfiest the wants of all thy creatures. And while I muse upon thy majesty and benevolence, may I be enabled to bless thy name with transports of gratitude, and reverentially to extol the miracles of thy wisdom. O! that it may henceforth be my most pleasing occupation, to declare thy goodness, and to sing of thy mercy before all thy people!

## MAY V.

### *The Dawn of Day.*

The morning dawn discovers to the world a new and magnificent creation. The shades of night deprive us of the sight and enjoyment of the heavens and the earth; but when the light of day returns, we behold all nature renewed and embellished. On a sudden we see the earth arrayed in all its magnificence; the mountains crowned with forests; the hills clothed with vines; the fields covered with yellow grain, and the meadows watered with rivulets.

The horizon literally glows: the clouds are tinged with the liveliest colours; flowery vales are discovered at a distance; the light vapours are converted into gold; and the dew-drops which rest on the expanding flowers assume the mild lustre of pearls. By degrees, as the light increases, the spectacle becomes more superb, till, at last, nature presents us with her most glorious object.—The Sun rises; and the first ray that escapes over the tops of the mountains, darts rapidly from one

end of the horizon to the other. New rays follow, and strengthen the former; till, by degrees, the disk of the sun shows itself entire; then advances farther into the sky, and runs its course with a majesty which the human eye can no longer sustain! Were any one to see, for the first time, this fascinating scene from the top of a hill, what would he think? what would he do? Doubtless he would prostrate himself, full of sweet emotion and pious respect, to adore that God who is the Author of the sun; and, in the beauties of the rising day, to acknowledge his power and wisdom. With the lark, which, soaring in the air, salutes the morn, and proclaims its arrival by the sweetness of its notes, he would soar towards thee, O Lord! who art the Father of the whole creation. The joy and gladness of all nature, the animation of every being, invite us to raise our souls towards thee with the most lively transports of gratitude and joy. At this moment, while the sun is darting its first rays upon the earth, millions of creatures praise and adore thee. From thee proceeds each beauty of the morning dawn; from thee, who art the source of light. It is thou who hast given it these lovely colours, and impressed a sense of them on our souls! Thou hast given us souls of a heavenly nature, capable of tracing thee in all thy works. Our eyes seem to behold thee in the splendor of the rising sun.

But how much are those indolent men to be pitied, who never afford themselves the heavenly pleasure of contemplating the rising sun! Oh! were they but rational enough to indulge in the

pure and delightful enjoyment which this magnificent object of nature is so calculated to inspire; could they but feel that the sight of beauteous nature must fill the heart with pious delight and profound veneration for the Creator; could they, in fine, comprehend, that one single thought which rises in the soul on seeing the dawn of day, may become the happy beginning of a virtuous life; would it not amply recompense them for a few hours snatched from unnecessary repose?

## MAY VI.

### *The Wonders of Vision.*

THESE rays, which enter the eye, pass through the cornea, the aqueous humour, and the pupil, into the crystaline lens. After having been sufficiently refracted, and then reunited in their passage through the vitreous humour, they impress on the retina the images of exterior objects, with the utmost precision; and the optic nerve which terminates in the retina, conveys these impressions to the mind, and produces perceptions and ideas conformable to the different sensations excited by the object presented. Hence it will appear, that the faculty of vision is one of the most wonderful properties of human nature, and well deserves to be more particularly considered. The images of external objects are painted upon the retina in an inverted position, and yet we see them in their real situation. How is it that the largest objects are painted in our eyes extremely small, and yet

we see every thing according to its real size? How is it, that, when we see, from a high tower, some hundreds of houses below us, in a great city, each of them is painted so exactly in our eyes, on a space which is scarcely three times as large as the head of a pin? So many millions of rays come through a very small aperture, and collect together on the retina which lines the inside of the eye, without the least confusion, though they preserve among themselves the same order with the parts of the objects from which they proceeded. But this is not all: let a person from the top of a high mast, contemplate a fleet in full sail; or let him view the sea itself—how many millions of waves will he discover! *Each* of these reflects an immensity of rays upon the eye, which, notwithstanding its smallness, distinctly receives the whole. Again: let any one go to the top of a mountain in a clear day, and view the circumjacent country; each tree, each plant, and every blade of grass, sends rays of light to the eyes, without which it would be impossible for us to discover that continued verdure which appears in every part of the landscape below us. Is it not also very astonishing that we do not see double; and, though we have *two* eyes, each object appears *single?* Another cause of admiration is, that those objects which we see are not only visible to *us:* we are surprised at the number of rays they send to so small a space as the pupil of the eye, yet they convey as much to spaces of that size every where. It is for that purpose, that, wherever we go, new rays supply the place of the preceding, and render the

same objects visible which we perceived previously to our changing place. The rays necessary for that purpose already exist, and only wait to meet our eyes. But all the rays that are admitted do not take effect: along with these there are numberless others, which, being much weaker, are effaced by the splendor of the first, but are always ready to perform the same offices when required. If we perforate a sheet of paper with a pin, and look through the hole (so much less than our eye), we still see the same objects, though they may appear much smaller. But who properly reflects upon this interesting subject? The habit of discovering objects as soon as we open our eyes, causes us to consider this operation as a thing extremely simple, and easy to comprehend. We are, however, far from being able to explain the manner in which we see objects. We know, indeed, that images are impressed on the retina, and that all the parts of the eye contribute to such impressions: but this is not sufficient; for the eye can have no idea of what passes in itself: it is, therefore, necessary, that the impressions which the rays make upon it should reach to the brain: and that, in order to do so, the rays should paint the image on a coat woven with nerves, which correspond with those of the brain. In this manner the motion impressed by the rays on the nerves of the retina, is transmitted by the optic nerve to the brain. But we cannot properly describe what passes there; because we do not perfectly know either the nature of the brain, or the use of its several parts.

These wonders, which are beyond our conception, are evidently the work of Divine Power, united with infinite goodness, as they are all so many blessings bestowed upon us. O! that our souls may incessantly acknowledge the Creator's wisdom, and that our lips may declare the wonders of his name!

## MAY VII.

### *Spring renews the Face of the Earth.*

WHAT a change has taken place throughout nature, and how great is the goodness of that Supreme Being, who causes the seasons to succeed each other with such perfect regularity! Our earth, which rested during winter, resumes its ornaments and its fertility. The whole creation is animated, revived, and full of joy and gladness. A few months ago, the whole surface of the earth was barren and desert. The valleys, the prospect of which is now so pleasing, were then buried in a deep snow. The mountains, whose grey tops rise to the very clouds, were covered with snow and ice, and enveloped by impenetrable fogs. In those verdant walks where the nightingale now pours forth the sweetest music, nothing was seen but withered trunks and leafless branches. The brooks and rivulets that now run murmuring along, were arrested in their course, and encrusted with ice: and the feathered choristers, which now fill the air with responsive notes, were either benumbed in caves and marshes, or compelled to migrate to other climes. A

mournful silence reigned every where: and, as far as the eye could extend, nothing was seen but a dreary solitude.

Scarcely, however, has the invigorating breath of the Almighty been felt, when nature awakes from her stupor, and spreads a thousand charms around us. The sun seems to approach our globe, and the atmosphere is penetrated with his quickening warmth: the whole vegetable kingdom proves his beneficent effects; and the earth produces grass, flowers, and herbs of every sort. Now the whole face of the earth is renewed and embellished; and, at the sight of this happy revolution, we are naturally excited to look up to the great Being who is the cause of all.

"Lord, thou visitest the earth, and makest the valleys to smile. Thou sprinklest them with dew to enrich them; and the fountains whence thou waterest them are always plentiful. At thy command our harvests ripen and fill our hearts with joy. Thy blessing rests upon our furrows; and thy rain refreshes the thirsty earth. Thou makest it soft, and blessest the seed. Thou crownest the year with thy blessings, and thy word maketh the ground fruitful. Flowers and fruits spring up under thy footsteps, and blessing and fertility are thy constant attendants. The pastures of the desert are watered, and the little hills are adorned with a beautiful verdure. The countries are covered with flocks, and the valleys are full of corn. Every place resounds with songs of joy and gladness. The praises and thanksgivings of universal nature rise to heaven itself."

In this revolution, which the spring produces, I behold an emblem of the salutary change which a soul experiences that has not resisted the operations of the Divine Spirit. Ignorance vanishes; folly and vice disappear: the passions are subdued; and the heart is filled with virtuous and religious sentiments, which delight and edify mankind.

While musing on these subjects, it is natural to inquire, Shall *I* be the only creature destitute of life, grace, or spiritual growth? Shall I continue barren and lifeless whilst the face of the earth is adorned with universal fertility! Rather let me pray that this spring of nature may become the epoch of a renovation in my own soul, that I may henceforth produce those fruits of righteousness which may be pleasing to God, and beneficial to my fellow-creatures.

## MAY VIII.

### *The Germination of Seeds.*

MANY changes in the vegetable kingdom are now taking place under our immediate inspection; but there are many more which operate in secret, and consequently escape our notice. The seed which, some time since, was deposited in the earth, now swells, and the plant gradually sprouts and shoots up. This operation seems peculiarly entitled to our attention, as it is the source of all the beauties which spring and summer exhibit in the vegetable world.

The seed is composed of different parts, according to the various species: but the principal is the germ. Each shoot has two parts: the one simple, which becomes the root; the other laminated, which becomes the stalk and head of the plant. The body of most kinds of grain is composed of two pieces, which are called lobes, and these are filled with a mealy substance, which serve for seminal leaves to the plant. Mosses have the most simple seed of any: it consists only of the germ, without pellicles or lobes. A certain degree of moisture and warmth are absolutely necessary to make the seeds spring up. The increase of heat, and the difference observable in the taste and smell, seem to discover a sort of fermentation. By means of this preparation, the mealy substance of the lobes becomes proper to nourish the tender germ.

It is known by experiments, which have been tried with coloured juices, that this substance imbibes a moisture, which furnishes a proper nourishment, with the assistance of air and of heat, till the plant has acquired sufficient strength to profit by the juices which the root imbibes. Then the exhausted lobes dry by degrees, and at the end of a few weeks fall off, when the plant no longer requires them. Certain herbs, which grow on mountains, are of a very particular nature. As their duration is short, it would often happen that the seed would not have time to ripen. In order, therefore, that the species should not perish, the bud, which contains the shoot, is formed at the top of the plant, puts forth leaves, falls,

and takes root. When the plant comes out of the earth, it would run too great risk, if it were suddenly exposed to the outward air and the power of the sun: its parts, therefore, remain folded upon each other, nearly as they were in the seed; but, by degrees, as the root strengthens and extends on all sides, it furnishes the upper vessels with abundance of juice, by means of which all the organs speedily unfold themselves. The plant is, at first, almost gelatinous, but it gradually acquires more consistence, and continually increases in size.

This epitome of the history of the germination of seeds, is sufficient to show how many preparations and means nature makes use of to produce a single plant. When, therefore, we see a seed spring up which we have sown, we must not imagine (as is usually the case), that it is unworthy our attention: for it is, in reality, one of those wonders of nature which have excited the observation of some of the greatest of men. At the sight of this phenomenon, let us silently admire the power and wisdom of that God, who is adorable in all things. The order with which the plants so regularly succeed one another, is a proof of that wisdom which manifests itself even in the smallest things. This should remind us, that our moral nature also contains a certain seed, which shoots up with time, increases, and bears fruit. In the designs of the Creator, this was a mean to lead us to felicity; but our natural corruption and outward circumstances often counteract these merciful intentions.

## MAY IX.

### *The Chick in the Egg.*

We are under great obligations to those naturalists whose laborious researches and patient investigations have thrown a satisfactory light upon the generation and propagation of animals. Nothing contributes more to the glory of the Creator, than the observations which are made on the wisdom that manifests itself in the production of animated beings. The less we are able to give an account of *all* his works, the more earnest we should be to take every opportunity of becoming acquainted with *some* of them. With this view, let us now consider the formation of the chicken in the egg, as it has been discovered by one of the greatest naturalists.

The hen has scarcely sat on the egg twelve hours, when some lineaments of the head and body of the embryo-chick begin to appear. At the end of the second day, the heart begins to beat, and assumes the form of a horse-shoe, but the blood is not yet perceptible. At the end of forty-eight hours two vesicles of blood can be distinguished, and their pulsation is very visible: one is the left ventricle, the other the root of the great artery. At the fiftieth hour, one auricle of the heart appears, resembling a noose folded down upon itself. The pulsation of the heart is now observed first in the auricle, and afterwards in the ventricle. At the end of seventy hours one may distinguish the wings; and on the head two bub-

bles for the brain, one for the bill, and two others for the fore and hind parts of the head. Towards the end of the fourth day, the two auricles, already visible, draw nearer to the heart than they did before. When an auricle appears first, it seems to have two horns, but this is afterwards found to be two auricles. The liver appears towards the fifth day. At the end of 131 hours, the first voluntary motion is observed. At the end of 138 hours, the lungs and stomach become visible; and at the end of 142, the intestines, the loins, and the upper jaw. At the 144th hour, two ventricles are seen, and two drops of blood, instead of the single drop which was seen before. The seventh day, the brain, which was mucilaginous, begins to assume some consistence. At the 190th hour the bill opens, and the flesh appears on the breast. At the 194th, the sternum, or breast-bone, may be seen. At the 210th hour the ribs come out of the back; and the bill is very visible, as well as the gall-bladder. The bile becomes green at the end of 236 hours: and if the chicken be taken from its integuments, it evidently moves itself. The feathers begin to shoot out towards the 240th hour, and the skull becomes gristly. At the 264th hour, the eyes appear; at the 288th, the ribs are perfect; and at the 331st, the spleen draws near the stomach, and the lungs to the chest. At the end of 355 hours, the bill frequently opens and shuts; and at the end of 451 hours, or the 18th day of incubation, the first cry of the chicken is heard. It afterwards increases in size and strength, till at

last it sets itself at liberty, by opening the prison in which it has been confined.

By so many different degrees are these creatures brought into existence. All these progressions are made by rule; and there is not one of them without a sufficient cause. If, for example, the liver is always formed towards the end of the fifth day, it is founded on the preceding situation of the chick, and on the changes that are to follow. No part of its body could appear sooner or later without some injury to the whole embryo; and each of its members becomes visible at the most convenient moment. This arrangement, so wise and so invariable, in the production of this animal, is manifestly the work of a Supreme Being. But we shall more sensibly acknowledge his creative powers, if we consider the manner in which the chicken is formed out of the parts which compose the egg.

How wonderful is it, that there should be, in this egg, the vital principle of an animated being! that all the parts of an animal's body should be concealed in it, and require nothing but heat to unfold and quicken them! that the whole formation of the chicken should be so constantly and regularly the same! that, exactly at the same time, the same changes take place in twenty eggs, or more, that a hen hatches! that, when the position of an egg is changed, and it is turned from one side to the other, it does not in the least hurt the fœtus, or prevent its formation! and that the chicken, when hatched, is heavier than the egg was before! These, however, are not all

the wonders manifested in the formation of a chick. The microscope and the scrutinizing observations of man have only discovered those things which come more immediately under our senses: but many things may still be reserved for those who come after us, or of which we shall not have a perfect knowledge till in a future state. How many inquiries may be made upon this mystery of generation!—inquiries which the human mind can never resolve. But let not this ignorance discourage us; let us only consider how to make a good use of our small degree of knowledge, by employing it in celebrating the wisdom, power, and goodness of our Creator.

## MAY X.

### *On the Buds of Flowers.*

On all sides I discover a multitude of flowers in the bud. They are at present enveloped and closely shut up in their intrenchments: all their beauties are hidden, and their charms are veiled. Such is the wretched miser, who lives by himself, who centres all in himself, whose views are mean and selfish; and who makes his own private advantage or personal pleasure the only object of his desires, and the narrow motive of his actions.

But soon the penetrating rays of the sun will open the buds of the flowers, and emancipate them from their silken bonds, that they may blow magnificently in our sight. With what a charm-

ing bloom will they then shine! what delightful perfumes will they exhale! Thus, the most sordid miser will become beneficent, when his soul is enlightened by God's grace. To a heart of stone may succeed a feeling and compassionate one—a heart susceptible of the sweetest and tenderest emotions. By the mild influence of the Sun of Righteousness, the social affections discover themselves, and spread more and more. Sensibility no longer centres in one object: it becomes universal; taking in all mankind, extending its generous cares to the utmost distance, and cheering all within its reach.

The appearance of the numerous buds of flowers which now surround me, naturally leads me to reflect upon you, O lovely youth of both sexes! The beauty and power of your minds are not yet unfolded: your faculties are still in a great measure concealed. The hope which your parents and masters conceive of you will not so soon be realized. When you walk with your parents in the country or gardens, consider these buds, and say to yourselves,—I resemble that bud: my parents and masters expect from me the unfolding of my talents and faculties; they do every thing for me; they neglect nothing for my information and instruction; they watch most tenderly over my education, to the end that I may become their joy and comfort, and make myself useful to society: I will, therefore, do all in my power to gratify the pleasing hopes they form: I will take advantage of all their instructions, in order to become every day wiser, better, and

more amiable: for this purpose I will take care not to give way to the desires and passions of youth, which might be fatal to my innocence, and destroy all the hopes conceived of me.

"In the morning of life I flourish like the bud which opens insensibly. My heart pulsates with joy, yields to the most cheerful hopes, and sees nothing but happiness before me. But if I am imprudent enough to give a loose to wild desire and the false pleasures of luxury, those guilty flames will soon dry up and consume my youthful heart."

## MAY XI.

### *Indefatigable Labours of the Bee.*

It is one of the advantages of spring, that it furnishes us with an opportunity of observing the industry and labours of the bee; and certainly, a beehive is one of the most interesting sights which an admirer of nature can behold. We cannot tire of contemplating that laboratory, where thousands of artificers are employed in different works. We are in a continual state of surprise on seeing their order and regularity; and particularly in those magazines, so plentifully furnished with all that is necessary for the subsistence of the society in winter. But what most deserves attention is, the indefatigable application and uninterrupted labours of this little colony. Bees present us with an example of diligence and activity, which is not only very uncommon, but which has probably

never had its equal. They begin to appear as soon as the winter is past; even when it might be feared that the cold would hurt them, and benumb their delicate limbs. When the juices of the flowers, which begin to blow, have not yet been sufficiently ripened by the sun, so as to furnish honey in plenty, the bees still gather some little for their food: but their cares and activity are evidently redoubled during spring and summer. In these seasons, they do all they can, and do not despise the smallest profits, provided they can only increase their stores. In building their cells they are so indefatigable, that we are assured a honeycomb of double cells, such as three thousand bees can lodge in, is completed in twenty-four hours. This work is divided amongst the members of the colony. While some of the bees are gathering the wax, preparing it, and filling the magazines, others are employed in different works: some take the wax and make use of it to build their cells; others knead, polish, and purify it; others extract the honey from the flowers, and lay it in the hive for daily subsistence, and for future support; and others close, with a covering of wax, the cells in which they keep their winter's provision of honey. Some carry food to their young, and shut up the cells of the little ones that are near the time of transformation, to prevent their being disturbed in working their way out. Some stop up, with a glutinous substance, all the chinks and holes in the hive, and cover all the weak places, that neither the wind nor insects may find entrance: while others

drag out of the hive the dead bodies which might infect them; or, if these bodies are too heavy to be removed, they cover them over with a sort of birdlime or wax, and cement it in such a manner, that, in corrupting under that crust, they cannot exhale any offensive smell.

But it is not enough to *admire* the activity of these little creatures: we should learn to *emulate* them, and propose them to ourselves as models of industry. We have many more motives for diligence than those insects: the bee collects nectareous sweets not for herself, but for her owners: but in attaching ourselves to the precepts of true wisdom, we labour for ourselves, and gather fruit for eternal life We have an immortal soul of inestimable value. With what application ought we to labour for its happiness, and avoid what might lead to its ruin! What is more calculated to excite us to activity and indefatigable diligence, than considering that the fruit of our labour does not merely extend to a few days and years, but to eternity itself?

Let us, therefore, never be slothful in doing good; but let us acquit ourselves of our duties with all possible zeal and fidelity. Let us accomplish without delay the task allotted us, before the winter of sickness and old age approaches, and before death has finally decided our destiny.

" O man! go to the bees for instruction, consider their labours, contemplate their works, and admire their active and unceasing industry. Ever busy, ever indefatigable, they toil from morning till evening, and cheerfully support the troubles

of their short existence! And wilt *thou* repose on the lap of indolence, or consume thy time in frivolous and hurtful pleasures? Rather strive to exceed the industry of these insects, which have not received, like thee, the inestimable gift of reason. Thy life is of short duration: may it be unremittingly devoted to labour, for the glory of thy Creator, and the welfare of thy soul! The time which God hath given thee should not be consumed in indolence and effeminacy. Thou art endowed with life, strength, and reason. Sanctify them by the love of virtuous labour, and let the seasons of youth, manhood, and old age, be devoted to the service of the Almighty."

## MAY XII.

### *How God has provided Food for Animals.*

From the elephant to the mite, there is no terrestrial animal which can live without food or nourishment; from the eagle to the gnat, no bird can do without it; from the leviathan to the smallest worm, no reptile can subsist without eating; from the whale to the oyster, there is nothing in the waters to which food is not necessary. But, in forming these creatures thus, God has at the same time ordained, that there should always be an abundance and variety proper for their sustenance. As many species of animals as there are, so many sorts of food are destined for their support: so that there is no creature on earth that does not find the food adapted to its nature. In respect to

this, we may divide animals into three classes. The first includes all those which subsist on the flesh of others: some of these, as the lion, prefer quadrupeds; others birds, as the polecat; others fish, as the otter; and others insects, as different species of birds. There are some exceptions in all these; but, in general, it is certain, that each species has its particular food designed for it by the Creator. The second class comprehends those animals which seek their nutriment in the vegetable kingdom. Almost every species of vegetables is the food of some particular animal. Some prefer grass, others the fruits of trees; and, among those which live upon the same plant, there is still a remarkable difference—some feed only on the root, others on the leaf; some prefer the stalk or body of the plant, others the marrow or seed, or the whole fruit: there are some also which eat the whole plant. The third class comprises those animals which subsist on minerals; these are mostly insects; and it is rather difficult amongst them to ascertain what food such and such sorts in particular require, because those little animals cannot be so easily observed as others; it is known, however, that some of them feed on earth, others on stones: and if we consider, that there is scarcely any beast or plant which does not serve as food to some animal, we shall easily conceive that it must be the same in respect to the mineral kingdom, and that there is nothing there which does not serve, directly or indirectly, as food for some insect. I here comprehend the words of David:—"The eyes of all wait upon

thee, O Lord, and thou givest them their meat in due season! Thou openest thine hand, and fillest all things living with plenteousness!" The cares of Divine Providence are evident proofs of that eternal goodness which extends over the universe. Reflect on the prodigious number of animals which exist! How many millions of species of birds and insects, and how many hundred millions of each sort! All these creatures find their daily sustenance. How many millions of animals live in all parts of the earth! How many hundred millions of each kind find dwelling and food in the forests, the fields, the mountains, and valleys; in the caves and hollow parts of rocks; upon and in trees; in turf, in stones, &c.! What innumerable shoals inhabit the ocean! what immense numbers of fish swim in the sea, and in rivers! All these find a daily supply of food. How inexpressible the multitude, how astonishing the variety of insects which every where surround us!—millions of millions repeated! Insects in the air, in plants, in animals, in stones, and upon other insects! all constantly find their daily sustenance! How infinitely, also, does the wisdom of the Creator shine forth in his manner of providing for all these animals! He gives them all the food fit for them, and adapted to their nature; for each kind of food does not indifferently suit all animals—a particular sort is required for quadrupeds; another for birds; others for fish and insects. This distribution of aliments is a mean wisely ordained by the Creator, to afford sufficient food for each species of animals, and to prevent

any of the sustenance which the earth produces from being useless.

Now if God so provides for animals void of reason, what will he not do for man? Such is the conclusion we may, and ought, to draw, from seeing the plan of Divine Providence, which gives to all the beasts of the earth every thing necessary for their support. O man of little faith! anxious, restless, discontented man! go and reflect on the goodness with which the Lord sustains the life of animals, and let that teach thee to be content, and trust in God. Behold the birds of the air; the fallow deer on the rocks, and in caves; the fish in the sea; the animals in the fields and the forests—all find food and habitation. Great in the smallest things, as well as in the highest, God does not disdain or neglect the poorest worm on earth. Can it then be possible that *man* should be the only creature that is not the object of his paternal care and attention?

## MAY XIII.

### *The Senses of Animals.*

THE organs of sense are arranged, in all animals, in a manner most conformable to their nature and design. By means of these, they take cognizance of objects, whether near or distant, and by these they are enabled to provide for their wants, and to avoid the dangers to which they are exposed.

The sense by which animals can form an idea

of corporeal objects as soon as they touch them, is called *feeling;* and this, in beasts, as well as in mankind, has its seat under the outward skin, the extremities of which are covered with a multitude of nerves or sinews. It cannot be exactly ascertained what revolutions feeling goes through in the greatest number of beasts. It is even doubtful whether insects be not endowed with another sense, and whether their antennæ or horns be not the organs of a sense entirely unknown to men. Birds, fish, serpents, and some other animals, appear to have no feeling.

The organs of *taste* are principally the tongue and the palate, which receive the impressions of relish; but the *papillæ* of the nerves are the immediate instruments of it, as likewise of the touch: there is, accordingly, a great analogy between these two senses. *Smelling* has for its organ the membrane which lines the inside of the nose; and it is by means of the ramifications of the nerves upon this membrane that we perceive those odorous vapours which float in the atmosphere. Animals which require a nicer and keener smell, are, therefore, endowed with a greater perfection of this organ. Worms appear entirely destitute of it, and perhaps, also, fish and insects; but it is possible, that, in the latter, the horns may be the organs of smell. By means of this sense, beasts find whatever is necessary for the preservation of their life; birds and reptiles discover their food; and many animals are apprised of the approach of their enemies.

*Hearing* conveys to animals the tremors and vi-

brations of the air. The construction of the ear is not the same in all beasts. Some, like the lizard, have two tympanums; some are deprived of several parts which most other animals possess. It is supposed that neither birds nor fish have that part which is called the *meatus auditorius,* and that insects and worms are absolutely deaf.

The eyes are the organs of *sight.* Quadrupeds, fowls, fish, and amphibious animals, have all two eyes, one on each side of the head. Insects, on the contrary, have more than two. The spider and scorpion have eight; and the greater part of the others have them in profusion, generally collected into two orbits. In a fly, sixteen thousand eyes have been enumerated: in a beetle, six thousand three hundred and sixty-two; and in a butterfly, thirty-four thousand six hundred and fifty!! The number and position of these eyes compensate insects for their incapacity of turning or moving them. Fish have none of the aqueous humour, but their crystaline is nearly globular.

All the organs of sense are evidently disposed in such a manner as is conformable not only to the structure of animals, but also to their various necessities; as a few observations may suffice to demonstrate. As the eyes of most insects are immovable, and, of course, useless on many occasions; nature, to supply this defect, has given them antennæ, by which they can discern whatever would be injurious to them, and what might escape their sight. The eyes of fish are disposed with equal wisdom: a full projecting eye would not suit them; for which reason their cornea is

quite flat; but, to remedy this defect, the Creator has given them a crystaline perfectly spherical; whereas, in animals that live in the air, it is lenticular, and consequently flatter. Though the form of all eyes, in general, be round, yet even in this roundness we may discover great diversity; and their situation in the head is infinitely varied, according to the different designs and wants of animals. In man, who sees little but what is before him, the eye is placed in the fore part of the head, but so contrived that he can receive the impression of nearly the whole semicircle of objects before him. In birds, on the contrary, the eye is situated in such a manner, that it admits almost the whole sphere of surrounding objects; by which these animals are enabled to seek their nourishment, and to shun the dangers to which they are exposed. The *ear* of man has the form most analogous to his upright position. In birds its posture is the best adapted for flight: it does not project, for this would be an obstacle to their progressive motion; but it is close and covered, in order to leave them a free passage through the air.

What wisdom! what economy! what admirable art, in the arrangement and the whole disposition of the senses of animals! But, perhaps, we only know the smallest part of this wonderful mechanism; and, undoubtedly, most of our observations in this respect deserve less the name of discoveries than of probable conjectures. If we could obtain a more perfect knowledge of the interior construction and use of the senses of animals, we

should have still more reason to admire the wisdom of God. Let us, at least, employ the little we do know of them, in praising and glorifying our common Creator. The more imperfect our knowledge of animals is, the more we ought to abstain from looking upon them with indifference and contempt. Let us rather consider them as a mirror of the Divine power and wisdom: for animals themselves may afford us incontestable proofs that they, as well as mankind, are the workmanship of that adorable Being who is great in counsels, and infinite in wisdom.

## MAY XIV.

### *Order in the Succession of Flowers.*

Every plant appears on the earth in the order prescribed to it. The Creator has exactly fixed the time in which one is to unfold its leaves, another to blossom, and a third to wither and fade. Several weeks ago, we saw the snow-drop spring from the ground. A long time before the trees ventured to open their leaves, and when the earth was still covered with snow, it dared to peep out, and was the first of all the plants, and the only one which delighted the eye of the florist. Next appeared the crocus, though timidly, because it was too weak to bear impetuous winds. With it appeared the sweet violet and the auricula, so admired for its brilliant colours and the variety of its species. All these plants, and some others which appeared on the mountains, were the van-

guard of the army of flowers; and their arrival, so agreeable in itself, had, besides, the merit of proclaiming the coming of a multitude of other flowers.

Now we see, in reality, the other children of nature appear, not all at once, but in a regular succession. Each month displays the ornaments peculiar to itself. The tulip begins to unfold its leaves and its blossoms. Soon the beautiful anemone will form its dome, and grow up round and full; the ranunculus will display all the magnificence of its leaves, and will charm our eyes with the most beautiful mixture of colours; and, to crown the lovely assemblage of flowers, the rose will open and bloom with all the beauties which distinguish it; and the carnation will show itself with that elegance which makes it so superior to its companions.

Let us pause here, and reflect on the wise and beneficent designs evident in this succession of flowers. If they were all to blow at the same time, there would sometimes be a great superfluity, and, at other times, a total want: we should scarcely have time to observe half their beauties, and we should be too soon deprived of them. But, now that each species has its appointed time and place, we may, in this pleasing succession, contemplate them more conveniently, and acquire a fuller knowledge of them. The beneficent and wise attention of Providence procures one more very great advantage: it not only presents to us each flower in all its beauty, but it makes up for the frailty of all those lovely productions of na-

ture: for, though there are always some flowers fading, fresh ones are continually coming forward to adorn our gardens.

What goodness in the Creator, thus to favour mankind with a constant train of benefits! not only to multiply, but to render them constant and durable! He literally leads us through paths of flowers. Wherever we go, they spring up under our feet, that the sight and enjoyment of them may enliven and soften the pilgrimage through life. The same order in which plants and flowers succeed each other, is also seen in the human species. Each man appears in the world in the place allotted to him by the all-wise Being: each is born at the time chosen by God for his existence. From the beginning of the world, the generations of men have succeeded each other on this great theatre, in the order, time, and place, allotted them by the Creator. In the moment that some are born, others are returning to dust: whilst one is preparing to be useful to the world, another, who has already acted his part, is going off the stage. Who knows when his turn will come? Let us ever be prepared to resign our place with the tranquillity of a good conscience.

## MAY XV.

### *The Zoophites.*

THE zoophites, or animal plants, are certainly insects; though, in their outward form, their immobility, and their manner of propagating by buds

and seeds, they nearly resemble plants; like which they may also be propagated by grafts and slips. Their animal nature only shows itself by their sensibility and voluntary motion. Most of the zoophites hold by a sort of root to the sea, or the waters they live in: some inhabit stony and chalky places; others are enclosed in a case like horn; while some are entirely soft and fleshy. They have all this in common, that, without any preceding connexion, new zoophites spring out of the surface of their bodies. Whilst these young animals are fastened to the stalk, they form together one single animal: they are nourished by it, and nourish by turns: but as soon as they are loosened from the stalk, they have their separate existence. The zoophites also multiply in another way, similar to the generation of plants: they form a sort of bud, which contains a young zoophite, that grows some time with the stalk, but at last falls off, and becomes a complete animal.

Could we ever have supposed that there were animals whose form was so like plants, and to spring up like them? From the ideas we have always had of the nature of animals, could we ever have suspected, that, in an animal, the brain, the heart, the stomach, and all the intestines necessary to life, should re-produce themselves? Could we have conjectured the existence of an animal, which has neither brain, heart, veins, nor arteries; which, from the mouth to the opposite extremity of its body, is but a hollow bag; which appears to be all stomach, all intestine; and whose very arms and legs are stomachs and intestines?

Could we ever have thought of an animal that could be engrafted like a plum-tree, turned inside out like a glove, and produce its young as a stalk shoots its branches? Formerly, the person who would have hazarded such ideas would have been deemed a madman; and yet it is now incontestable that there are such animals, which resemble plants, not only in their external form, but also in their manner of perpetuating themselves. By this discovery, made in the commencement of the last century, natural history has gained a great deal. It may even be said, that it has enlarged our ideas of the power of God. Since the discovery of animal plants, we have a new proof that the Almighty has distinguished his works by very small degrees, and that it is almost impossible to determine exactly where the animal kingdom terminates, and where the vegetable begins. It is generally believed, that the difference between plants and animals consists in the former having neither sensibility nor motion, and the latter having both. This, then, is the distinguishing characteristic between plants and animals: but how faint the shade, how light and almost imperceptible the line which separates the two kingdoms, when we think of the discovery of the zoophites! The several species of creatures rise, grow to perfection, and approach one another so nearly, that the limits which separate them can no longer be distinguished. Throughout all nature we see something of infinity, as the peculiar character of its great Author.

Eternal Being! who can conceive the immense extent of thy dominions? who can even compre-

hend the whole of any single part of it? What wonderful things will be discovered in future ages, that are now concealed from us! But what is already visible, sufficiently convinces us of thy infinite greatness.

May it, henceforth, be my employment to study the wonders of thy righteous government, and upon all occasions to glorify thy great and holy name. And, O that I may eventually arrive at that blissful place, where I shall see thee as thou art, and clearly understand the nature and extent of thy matchless wisdom!

## MAY XVI.

### *The Pleasure of Agriculture and Gardening.*

The cultivation of fields and gardens is one of the most agreeable occupations, and perhaps the only one of which it may be said, that the trouble it occasions is compensated by a thousand pleasures. The generality of laborious employments oblige men to confine themselves in their rooms or their workshops; but he who devotes himself to agricultural pursuits always breathes a pure air, and enjoys the magnificent spectacles presented on the theatre of nature. The azure sky is his canopy, and the earth, enamelled with flowers, is his carpet. The air he breathes is not corrupted by the poisonous exhalations of cities. A thousand agreeable objects pass before his eyes; and, if he have any taste for the beauties of na-

ture, he can never want pure and real pleasures. When Aurora opens anew the brilliant scene of the creation, he hastens to go out and enjoy it, in his fields, or in his garden. The orient clouds, tinged with gold and purple, announce the near approach of the sun. The verdant grass erects itself, as if to welcome the coming luminary, whilst the dew-drops on its points outvie the lustre of diamonds, emeralds, and sapphires. The herbs and flowers exhale delicious odours; and the air resounds with the songs of birds, expressive of their mutual loves and their universal joy. These concerts, indeed, may be considered as hymns of praise to the Creator, whose blessings they experience in the agreeable light and heat of the sun, the relish of their food, the sweet instincts of nature, and their cheerful vivacity. Is it possible, that at the appearance of so many pleasing and affecting objects, the heart should not be touched with delight, with love and gratitude towards God? Can the mind have a more pleasing employment than that of contemplating and praising his sublime perfections, the greatness of his designs, and the beauty of his works?

What contributes still further to render agriculture and gardening peculiarly pleasing, is, that an infinite variety of objects and occupations attach us to the work, and prevent that disgust which is the constant attendant upon sameness. There is a great diversity of shrubs, fruits, herbs, and trees, which present themselves to us under a thousand different forms. Nature leads the husbandman through various paths, and presents him

with a thousand agreeable changes: sometimes he sees one kind of plants springing out of the earth; others rising high, and unfolding themselves; others, again, in full bloom. Wherever he turns his eyes he discovers new objects. The heavens above, and the earth beneath, afford him an inexhaustible fund of pleasure and delight.

What agreeable hours may we pass, if, in this beautiful season, we visit the fields and gardens, in order to taste those pure pleasures with which such objects are calculated to inspire the heart! Let us therefore, when convenience will permit, abandon the smoky atmosphere of the city, and contemplate the grandeur of God in the works of nature; and at these times, let us give ourselves up unreservedly to the sweet sentiments of gratitude and joy.

Bless, bless the Lord! praise his works, and trace him in every field, and through every operation of active nature. It is he who ordains the return of spring, and tells the harvest when to fill with corn the granaries of the righteous and unrighteous man. O! think of him when, in spring, the soft breath of the zephyr, emblematic of his goodness, refreshes you in the air; and, in autumn, when the branches of the trees bend down under the weight of his bounteous gifts. He crowns the year with his blessings; he is the source of all felicity. He waters the parched plains, and fertilizes the barren earth. The towering forests, the flowery valleys, and the meandering rivers, exhibit traces of his goodness. In a word, we may, in all situations, and in every

object, meet with the adorable Lord of the universe.

## MAY XVII.

### *The Tulip.*

Of all flowers, the tulip has certainly the finest form. There is no silk-mercer, who, in the variety and beauty of colours, or the mixture of light and shade in his silks, can rival the perfection of this flower. The height of the tulip, its form, its tints, its masterly execution, make it the queen of flowers. And if we consider the millions that annually blow, all differing in brilliance and proportion, our admiration is irresistibly excited. To be convinced of the existence of a wise and good God, let us only contemplate one of these charming flowers, and we shall acknowledge, that such a master-piece of nature could never have been produced by blind chance, without the intervention of an intelligent Cause.

It is true, that, at present, tulips are produced and perpetuated by roots; but whence came the first construction of this machinery, and that first arrangement of which all the following revolutions are only the consequences? Must we not necessarily admit an intelligent Cause, which we call the Creator of the world? It requires as much wisdom and power to create one tulip, from which ten others proceed, as to create ten at once; for the new comers must have existed in their forerunners; and it is evident that their

form and number must have been previously determined. When we look at a bed of tulips, therefore, let us not limit ourselves to the admiration of their beauty, but let us admire, above all things, the infinite wisdom of God, who traced the drawing of these flowers, and executed them in such perfection.

The charms of the tulip, however interesting, lose some of their value when we consider that they merely please the sight, without gratifying the smell; and this is particularly the case when compared with the carnation, which, to the beauty of its form, adds the most exquisite perfume. Such is the fate of persons who are endowed with beauty, and set off their charms with every external ornament, but have neither a sound understanding nor an amiable heart. It is much more desirable to have fewer outward beauties, with a good disposition: the former captivate but for a very short time, while the beauty of the mind remains, when all the charms of form are fled; and the esteem which our virtues inspire, is constant and durable. A virtuous soul is pleasing both to God and man. It is formed by the rules of wisdom, and is decorated with the robe of innocence. The perfume of good works is spread around, wherever it exists, and it will hereafter be transplanted into the garden of Paradise.

One observation, which the history of plants affords us, is, that the more beautiful a flower is, the sooner it fades. In a very short time, nothing of this blooming tulip will remain but a dry and withered stalk. Its life and beauty last but for a

few weeks; age destroys its charms; its leaves fall off; its colours fade; and the tulip which so lately resembled a beautiful virgin, is now a deformed skeleton! What a useful lesson is this for us! How little can we depend on exterior charms! How uncertain and frail is beauty! How near is the approach of death! For what is our life, but the life of a flower? Those who resemble it in beauty, resemble it likewise in the shortness of their days; for, "Man that is born of a woman, is of few days, and full of trouble. He cometh forth like a flower, and is cut down*."

When the period of our dissolution arrives, may our lives be closed as honourably as that of the tulip. It has been the ornament of the garden, and the delight of the florist. Its death therefore is the more to be regretted, because its life was pleasing and useful. May these reflections induce us to live in such a manner, that when death approaches to cut us down, pious persons may bedew our graves with their tears, and say to each other, Alas! why was not so excellent a life longer continued?

## MAY XVIII.

### *Reflections on Grass.*

HOWEVER beautiful the flowers may be which are cultivated by the care and industry of man, we should know but little of the wonders of the ve-

* Job, xiv. 1, 2.

getable kingdom, were we to limit our researches to the contemplation of a flower-garden. Each field is a scene of the wonderful works of God, and has the same claim to our observation as the most elegant *parterre*. Can any thing be more astonishing than the prodigious quantity of grass in a field? Suppose a meadow to be a thousand yards in length, and as many in breadth; its surface would then be a million of square yards. And if, in stepping, we cover ten tufts of grass, then a square yard contains a hundred of these tufts. Whence it follows that in casting our eyes over the meadow, we see, at once, a *hundred millions* of these curiously-formed machines: and allowing that each tuft has a hundred tubes, by which it imbibes nutriment from the earth, this gives *ten thousand millions* of regular tubes. But this calculation is evidently below the truth. What an immense multitude, then, must be found in the whole meadow! and how small in comparison is the number of plants and flowers which are cultivated in gardens! Why has the Creator so prodigiously multiplied the productions of the vegetable kingdom? Why, from each sort of grass, does he cause to spring such a numerous multitude? It is, undoubtedly, that beasts, as well as men, may find sustenance. The fields are, properly speaking, the magazines for animals.

Another circumstance worthy of observation, in respect to grass, is, that it neither requires sowing nor tillage, but grows and perpetuates itself independent of our care. How sad and barren would our pastures and meadows be, if

we were loaded with the care of sowing the grass-seed, and of afterwards watering what our hands had sown and planted! But, at the creation of the world, God provided, that there should never be a deficiency of grass. From that almighty word of the Creator—"Let the earth bring forth grass, the herb yielding seed," proceeds the constant and uninterrupted fertility of our fields.

To reflect on the colour chosen for the grass, is sufficient to make us sensible of the wise and beneficent care of the Creator. If all those fields were red or white, who could for any length of time, sustain their dazzling splendor? If the predominant colour were darker and more gloomy, how melancholy would the face of all nature appear. But green is between both colours; it agrees with our eyes, and, far from offending or tiring, it pleases and refreshes them. It is also very remarkable, that, in this single colour, there is such a variety of shades, that there is not a plant, the green of which is exactly as pale or as deep as that of another. It is evident that, in the arrangement of the vegetable kingdom, God has not provided less for our pleasure than for our convenience. This double attention is well calculated to convince us of that supreme goodness and wisdom which extends over the whole earth. May the proofs of it, which daily present themselves before our eyes, never leave us cold or indifferent to it: on the contrary, let us employ that reason which we owe to God, in making ourselves, through all his works, acquainted with that infinitely wise and merciful Being.

Whenever we walk in the fields, let us indulge those meditations which the sight of the grass should naturally inspire. Infinite God! with what wisdom hast thou formed these plants! How mercifully hast thou provided for the sustenance of man and beast! With what bounty dost thou dispense the beams of the sun, and the fertilizing showers, for the increase of vegetables, which strengthen our bodies; milk, which affords so sweet and healthy a nourishment; and the flesh of animals, which is given in such profusion. For all these, and a variety of other advantages, which thou grantest through means of the fields, we desire to bless and praise thy holy name continually.

## MAY XIX.

*Sentiments excited by the Contemplation of the Sky.*

Who but a Spirit of unlimited knowledge and power could have formed that superb vault over our heads? Who could have given to those immense globes that perpetual motion, whose velocity is inexpressible—a motion which even the smallest grain of sand could not have of itself. Who commanded these enormous masses of heavy and inactive matter to assume so many different forms? Whence proceeded that connexion, that beauty and harmony, which shine through every part of the whole? Who regulated all things so exactly, according to number, weight, and measure? Who prescribed to those immense bodies

such laws as none could discover, but minds endowed with the greatest wisdom? Who measured those vast circles in which the stars move without the smallest deviation? Who put them into the course they run, and which they are to run without interruption? All these questions lead us to thee, thou adorable Creator! Self-existing, independent, and eternal Being! it is to thee the celestial bodies owe their existence, their laws, their arrangement, their power, and all the advantages they procure to the earth.

What sublime ideas arise in our souls, when we contemplate these magnificent objects! If the space in which so many millions of worlds revolve, cannot be measured by our understanding; if the globes, which run their prodigious courses there, are of a size to astonish us; if the fabric of the universe, constructed by the Creator, is of such immensity that our ideas are lost in it; what must *thy* greatness be, O God! and what understanding is able to conceive it! If the heavens and all their host have so much magnificence, beauty, and majesty, that the eye can never be satisfied with contemplating, nor the mind with admiring them, what must be thy beauty, thou eternal Being, of whose splendor and glory these creatures are but faint and imperfect images! What must be the incomprehensible extent of thy knowledge and understanding, since thou seest at one glance the whole immense space, with all the innumerable bodies it contains, and art so intimately acquainted with the nature and properties of all the beings thou hast placed there! What

depths of wisdom and knowledge must be found in thee, O Lord! who hast formed such admirable plans! How great must thy power be, to be able to guide and direct, according to thy will, the most immense bodies! to animate all by thy breath? and to preserve all by the word of thy power!

But would the Almighty have exhibited such demonstrations of his glory, without having some end in view? Shall the celestial bodies announce his boundless wisdom, infinite skill, and eternal power, without effect? Shall they, in vain, dispense a rich abundance of Divine favours? Are not all these things done that intelligent creatures may attend to them, reflect upon them, and make them the subject of frequent meditation? How stupidly indifferent must that person be, who admires the master-piece of some eminent artist, but neglects the art and infinite wisdom displayed in the works of the Creator! If those who execute great and beautiful works are entitled to our admiration, with what profound humility should we prostrate ourselves before that God who has constructed the magnificent edifice of the universe! The heavens proclaim his magnificence; and all the celestial bodies obey the laws which he has prescribed. And shall *man* alone refuse to obey the King of the universe, or rebel against his wise and salutary laws? The influences of his bounty descend upon us from every quarter, and bring us unnumbered blessings, pleasures, and conveniences. How ardently should we love, how gratefully adore him for all his benefits! O! what

abundant cause have we, individually, to exclaim with David, " I will sing unto the Lord while I live; I will sing praises unto my God while I have any being: my meditation of him shall be sweet, and I will rejoice in the Lord !"

## MAY XX.

### *The Fertility of Plants.*

THE magnificence of the terrestrial part of the creation shines in nothing more conspicuously than in the astonishing fertility of plants. A single one can produce thousands, even millions, of others. One tobacco-plant may yield forty thousand three hundred and twenty grains of seed: and, if we calculate, in proportion, the produce of four years, we shall find that from a single grain there may spring two trillions six hundred and forty-two thousand nine hundred and eight billions, two hundred and ninety-three thousand three hundred and sixty-five millions, seven hundred and sixty thousand grains of seed? An elm, twelve years old, has often produced a hundred thousand grains of seed: what a prodigious number might spring from these in a few years! Suppose the tree have but a hundred thousand buds, and that the shoot of each year contains only five, there will be then every year five hundred thousand plants, which may be considered as new. If to this we add what is produced by the extension of the root, by ingrafting, &c. we shall only be

surprised that the earth has not yet been exhausted by plants.

But we must also remember the numerous multitude of animals which derive their food from the vegetable kingdom. They annually consume so great a quantity of plants, that, if nature had not endowed vegetables with very extraordinary prolific qualities, there would be reason to fear their total destruction. But it is peculiarly worthy of remark that the very animals which consume, often propagate them. Birds eat fruits, but they void the kernels just as they swallowed them, without hurting them in the least. While they are pecking certain sorts of fruit, they scatter the seed about, and often to a great distance. This dispersion is necessary, in order that one species of plant should not fill a whole field. With the same design some seeds have little feathers or wings, to be dispersed by the wind. It is also certain that, in general, the plants are more fruitful than animals. This may be proved by comparing trees with four-footed animals: the former produce, annually, sometimes for several ages, a great number of new trees; whereas the greatest quadrupeds, such as the elephant, the mare, &c. have but one, or at most two young ones, and are often barren. Smaller quadrupeds, as the dog, the cat, the rat, &c. are much more prolific, but their fecundity bears no proportion to that of trees. Fish and insects approach nearer to it: tench lay about ten thousand eggs, carp twenty thousand, and cod a million. If, however, we compare this fruitfulness to the wild rose, mus-

tard, or fern, it will be found that these plants, and many others, multiply much more than either fish or insects; particularly if it be observed, that almost all plants multiply in several ways; whereas, most animals have but one method of propagating. A tree may produce as many new trees as it has branches, boughs, and even leaves.

With what wisdom, therefore, has God proportioned the animal and vegetable kingdoms! If the multiplication of vegetables were less considerable, a great number of animals would die of hunger; our fields, meadows, and gardens would be deserts, with only a few plants scattered here and there. On the other hand, if the Creator had ordained that the granivorous animals should increase more than the plants, the vegetable kingdom would soon be at an end; but, according to the relation between the two kingdoms, the inhabitants of both multiply in proportion, so that no species is destroyed.

Thus, O man, abundance and pleasure surround thee on every side: for it is for *thee* that the Creator has made the vegetables so astonishingly fruitful: it is for thy support, thy pleasure, and thy health, that he has produced such variety of plants, and in such great abundance. Count, if thou art able, those which cover a single field; their number is inconceivable; and this innumerable multitude is an image of the immensity and omnipotence of the Lord; who, throughout all nature, "openeth his hand, and filleth all things living with plenteousness."

## MAY XXI.

*Description of the Beauties of Spring.*

NOTHING is more worthy of admiration than the revolutions which spring occasions upon our globe. In autumn, every valley, field, and forest, present us with images of death; and in winter, nature is deprived of all her ornaments. The animals are melancholy; the inhabitants of the forest conceal themselves, and are silent; the earth becomes a vast solitude, a desert, a grave: and nature appears to have fallen into a state of inaction and insensibility. She, however, labours silently for us, whilst we are ignorant of that secret influence, that divine power, which is making preparations for the renewal of nature. All the objects which lately appeared dead, are now reanimated. In the trees alone, what a number of changes take place! First, the sap which, in winter, had entirely forsaken the trunk and branches, rises slowly up its invisible channels, and particularly in the bark, through ways which can neither be guessed at, nor discovered. This sap serves to swell the buds: and what treasures of divine power are contained in these little recesses! The leaves, with their cheerful green; the branches which are to shoot through between the unfolded leaves; new buds upon these branches, full of leaves, though still invisible! then, that multitude of blossoms, with the sweet exhalations which embalm the air; in those blos-

soms fruit, and, in the fruit, the seed of an infinite number of other trees!

The cheerful splendor of the sun transports and animates the soul; and the activity of nature, in the plants around us, charms the sight. There is not a field which does not present a beautiful landscape to the eye, and flowers to the smell. Almost every bird sings its hymn with more or less melody. How cheerful the song of the linnet, hopping from branch to branch! It throws out its voice as if it had formed the design of particularly drawing the attention of man to delight him. The sprightly lark rises in the air, and seems to salute the day with its pleasing notes. The cattle, by their cries, express the spirit and joy with which they are animated. In the rivers we see the fish (which, during winter, had fallen, frozen and motionless, to the bottom of the water) now rising near the surface. They have recovered their former vivacity; and their pliant, gentle, pleasing motions, amuse our sight.

How is it that we can so often behold these objects, without feeling the most profound and respectful admiration of that eternal Being, whose power so gloriously manifests itself! Never should we breathe the pure and refreshing air of spring, without suitable and useful reflections.

Let us never contemplate the foliage of a tree, the golden treasures of a corn field, the beauteous enamel of a meadow, or the sublimity of a forest; —let us never pluck a flower, nor walk in a garden, without remembering that God shelters us with the delightful umbrage of the trees; that He

clothes the fields and woods with their beautiful verdure; and that He alone gives to the flowers the richness of their tints, and the fragrance of their perfumes. Let us recollect that all these things result from the goodness of that God who has rendered us abundantly more happy than thousands of our fellow-creatures, and at whose command the cheerful spring revives the face of the earth.

Above all things, let us adore our Creator for the inestimable gift of his grace. Spring itself would comparatively be destitute of charms, and would be much less calculated to inspire us with delight, were we deprived of those sublime joys which his grace sheds abroad in the heart. Merciful God! reveal thy love to our souls more and more, and vouchsafe to cherish in our breasts the blessed hope of one day enjoying the gifts of thy bounty in another and a better world!

## MAY XXII.

### *The Language of Animals.*

Man, properly speaking, is the only animal that can be said to have language; and it is particularly by this circumstance that he shows his superiority over all other animated beings. It is by means of speech that he extends his empire over all nature; that he rises towards his divine Author, contemplates, adores, and obeys him. It is by this that he learns to know himself, and the

creatures around him; and to make them subservient to his use. All animals except man are deprived of that faculty, because they are void of reason; and it is reason which capacitates us to learn languages, and the use of speech: but, as animals make their wants and feelings known by natural signs, as they utter certain sounds expressive of the sentiments which affect them, one may so far allow they have a sort of language. The variety of those tones, their number, their use, and the order in which they follow one another, form the essential part of animal language.

To form a just idea of this, it is not necessary to have recourse to deep researches; it may suffice to observe the animals daily before our eyes, and with which we have a sort of intimate connexion. Contemplate the hen with her chickens: if she find any food, she calls and invites them to it: they understand her, and come instantly. If they have lost sight of this tender mother, their plaintive cries express their distress, and their desire to rejoin her. Attend to the different cries of the cock, when a stranger or dog comes into the poultry-yard, when a kite or any other enemy appears, and when he calls or answers the hens. What do those lamentable cries of the turkey mean? See her chickens suddenly concealing themselves, and lying so quiet that one might suppose they were dead. The mother looks up to the sky, and her anxiety increases. But what is it she sees there? a black speck, which we can scarcely distinguish; and this speck is a bird of prey, which could not escape the vigilant and piercing eyes of

the mother. The bird of prey disappears, and the hen utters a scream of joy: her anxiety is at an end: the chickens revive, and gather joyfully about their mother. The language of the dog is equally copious and expressive. Who can be insensible to the joy that this faithful servant expresses at the return of his master? He jumps, dances, runs here and there; turns quick and lightly round his master; stops all at once; fixes his eyes upon him with the greatest tenderness; approaches, licks, and caresses him several times: then, beginning his play again, he disappears, and returns; puts himself in all sorts of pretty attitudes; barks; tells every body how happy he is; and shows his joy by a thousand sportive gestures. But how different are these sounds from the noises he makes at the approach of a robber, or those he utters on seeing a wolf! If we follow a dog in the chase, we may observe how he makes himself understood by his motions, and how exactly his signs correspond with the discoveries he wishes to impart.

This affords us an opportunity of admiring the wisdom and goodness of the Supreme Being. What beneficent attention has he shown towards animals, in granting them the power to express by sounds their wants and feelings! From their nature and organization, it was impossible they should speak the human language: but they would have been much more to be pitied, and less useful to us, if the Creator had entirely deprived them of the power of making themselves understood. To compensate them for the want

of speech, he has endowed them with address to communicate, by a thousand little ways, their feelings to each other, as well as to mankind. He has given them organs proper to produce and vary a certain number of sounds, by which each species makes itself understood. Hence it is, that, when we blow into the windpipe of a dead sheep or cock, we imagine we hear the animal itself. In a word, the Creator has given as much force to the language of animals, as their nature can admit of, and all that the end for which they were created required.

How perfect does man appear in regard to speech! The language of animals consists in a number of inarticulate and imperfect sounds. They have no ideas but those prompted by their senses, because they are incapable of learning a methodical language. They only know objects by some qualities evident to the senses, to which all their judgements and comparisons are limited. As for us, we possess faculties in all respects much superior. We can rise to general notions, and separate the object from the qualities which distinguish it. We can, by means of an infinity of articulate and arbitrary sounds, express all our conceptions. We can understand the connexion which unites us to other beings, act in consequence, and thus ensure our felicity.

Merciful Creator! let us never forget this important part of thy benefits. Whenever we speak may it be to show forth the excellence of thy wisdom, to adore the wonders of thy goodness, and

to express our gratitude for the privileges thou hast conferred upon us!

## MAY XXIII.

*The Magnitude and Number of Creatures on the Earth.*

How great and numerous are the works of the Lord! We must acknowledge this if we only know those which the earth contains; for how great is the extent of this globe, the abode of so many different nations! They occupy vast domains; and yet how many solitudes and deserts are there, which have never been inhabited by man! Neither does the land, taken altogether, fill near so great a space as that prodigious assemblage of waters called the sea. But if the earth itself be a proof of the greatness of the Almighty's works, we cannot cast our eyes on the creatures it contains, without admiring the number and variety of them.

In the first place, we find innumerable sorts of stones, minerals, and metals, concealed in the earth: then, what astonishing variety amongst the trees, plants, fruits, and simples which cover its surface! Notwithstanding all the pains that have been taken to observe and classify their different species, the work is still far from being completed.

Let us next consider the diversity observable in

living creatures. How great the disproportion between the eagle and the gnat, the whale and the gudgeon, the elephant and the mouse? and yet the whole space between them is filled with living creatures. The various species of animals come so near to each other, that it is sometimes difficult to distinguish one from the other; yet these species are so multiplied, that from the gnat to the elephant they form a sort of chain, in which each link is connected with the preceding one. In seas, lakes, and rivers, on the surface and in the bosom of the earth, there is no place which, some way or other, does not contain a living creature. Yet, however great the number may appear of these creatures visible to the naked eye, they are as nothing in comparison of those which are too small to be seen without a glass. By the help of the microscope, almost incredible discoveries have been made, of which, however, all who have an opportunity may be convinced with their own eyes. By these means, a new world presents itself, which was before utterly unknown, and such living creatures are seen, that imagination itself can scarcely form any thing so extremely small, since one of them is not near so large as the millionth part of a grain of sand. And it is not only their number and variety, but also the beauty and delicacy of their form which ought to strike us with astonishment. What appears dull to the naked eye, or even what escapes it entirely, has an inconceivable lustre and delicacy, when seen through the microscope. Gildings, which art cannot imitate, shine in the smallest grain of

sand, but particularly in certain parts of insects; for example, on the head and in the eyes of a little fly: and, in the construction of the lowest of animated beings, an exact symmetry and admirable order are observable. In a word, we find that millions of creatures, so small that the eye can scarcely distinguish them without the help of a glass, have, notwithstanding, as perfect an organization in their kind, and are as proper to fill the several purposes of the Creator, as the greatest animals with which the earth is peopled. Such considerations are calculated to give us a lively sense of our own littleness. We are lost in this innumerable multitude of God's creatures, which would suffice to attest his grandeur, though ourselves and millions of our fellow-creatures had never existed. In every element there are beings created and preserved: each grain of sand is a dwelling for insects, which are also in the class of God's creatures, and are links of the immeasurable chain. Here our ideas are lost in infinity. The more we reflect on the greatness and variety of his works, the more we feel the limits of our understanding. We have only to admire and adore!

## MAY XXIV.

*Spring is an Emblem of the Frailty of Human Life, and an Image of Death.*

At this season we need not go far to seek emblems of frailty and mortality: they present themselves

on all sides, being connected with almost every beauty of nature. Undoubtedly the Creator's design, in this respect, was to remind us of the uncertainty of the things of this world, and to repress the dangerous propensity we have to place our affections on objects so vain as all those in nature. Spring is the season in which the plants receive a new life, and, at the same time, that in which most of them perish. Serene as the days may appear, they are suddenly obscured by clouds, rain, and tempest. Sometimes the morn breaks forth in all the lustre of its charms; but before mid-day, its splendor, which had flattered us with the hope of fine weather, disappears. Sometimes, also, this hope is fulfilled, and the days of spring prove delightful. But how transient are their beauties, how swiftly they pass away! they vanish, even before we have had time to enjoy them. It is thus, that the best of our life (which is so often compared to the spring of nature) flies away. Often, in the morning, every thing smiles upon us, every thing promises joy and happiness; but before evening, or perhaps before noon, our hearts are oppressed by trouble, and drops of sorrow fall from our eyes. Let us take a retrospect of those years which may be said to constitute the spring of life. O! how short-lived were the pleasures of our youth! Nothing could have been more diversified than the pleasures we then enjoyed: but where are now those happy moments, those ecstatic delights? what is become of our uninterrupted vivacity, and the roseate hue which adorned our cheeks?

We no longer have a taste for those turbulent pleasures which then intoxicated us. What now remains of those fine days that are past?—nothing but a melancholy remembrance, unless we have made good use of them. How forcibly does the spring point out to us the frailty and end of life! Behold how far its charms extend! behold the trees full of blossoms! But let us not exult too much in their rich ornaments; shortly they will return to that dust whence they came. All that showy generation must die in the same spring which gave them birth. It is thus that our lives vanish. Their longest duration is but a day in spring. An unforeseen death hurries us to our graves, whilst the health and strength we enjoyed promised us a long course of years. Sickness and death often come upon us so much the more unexpectedly, as their approach is concealed under an appearance of youth and health. Let every one behold an image of himself in the spring blossoms, and there read his own uncertain state: how transient is their bloom! What a picture! how instructive!

Though these thoughts ought to render us serious, yet we should deeply enjoy both the spring of nature, and the pleasures of life, as they are bestowed upon us by the Creator; but, at the same time, let us mix reflections with these enjoyments which arise from the nature of spring and life. The thought of death is very consistent with every innocent pleasure. Far from infusing melancholy into our hearts, it should teach us to rejoice evermore in the Lord; it should guard us

against making a bad use of earthly pleasures; it should inspire us with a desire of solid and uninterrupted happiness. The beauties of the visible world give us an idea what must be the infinite beauty of the invisible and heavenly world; and, finally, when the time comes, in which our lives must fade away as the grass of the field, then may each of us say, with Christian fortitude, Though my life, like a spring flower, wither and turn to dust; though these cheeks, wherein the roses of youth shine, be a prey to corruption, I will still hope for a better life, which I shall never lose; and the body in which I shall then be clothed, will never decay.

## MAY XXV.

*Spring is an Emblem of the Resurrection of the Body.*

Most of the flowers which now adorn the earth, and excite our admiration, were once but coarse and shapeless roots. This presents us with a most interresting emblem of the resurrection of the righteous, and the state of their re-animated bodies. As the roots of the finest flowers, while buried in the earth, are destitute of form and beauty, but, when in bloom, exhibit a thousand charms; so the human body, which, while in the grave, is an object of horror, will experience a most astonishing change in the morning of the resurrection. "For what is sown in corruption is

raised in incorruption; what is sown in dishonour is raised in glory."

As soon as spring takes place of winter, life and joy succeed those melancholy impressions which a severe season makes on the mind of man, and the first fine day makes us forget the gloom of a tedious winter. Thus shall we forget, at the great day of the resurrection, all the sad and melancholy days of our past life. In this world the clouds of affliction cast a gloom upon our countenance; but when the new creation shall dawn upon us, grief shall be completely annihilated; nothing shall disturb our serenity; but our souls shall be filled with permanent and celestial joy.

The earth seems to experience a general renovation in spring. Dull and uninteresting as it appeared during the winter, so pleasing and delightful is its aspect now. We are charmed and gratified by each surrounding object, and can scarcely help imagining, each spring, that we are removed into a more cheerful habitation. It is thus that, at the day of the resurrection, we shall find ourselves transported into a new and magnificent dwelling. The new heaven and the new earth will be free from all the apparent or real defects of the globe which we now inhabit. Peace, order, beauty, and righteousness, will render our future abode the happiest that is possible to be conceived.

When the warm rays of the sun have penetrated the earth, millions of plants and flowers spring out of its bosom. So will it be in the great day,

when successive generations shall arise from the dust in which they have been buried. As the flowers of spring rise from their seed to attract our notice, and delight our senses, so the bodies of the righteous which have been deposited in the grave, shall one day arise, clothed with celestial beauty. Spring is the era of vegetation for grass, flowers, and every species of plants: it is then that every thing which has sprung up out of the earth unfolds itself more and more every day, and visibly increases in strength and beauty. And the day of resurrection will be, to the immortal soul of the Christian, the epoch of that unlimited progress which he shall make in all good: no weakness will then detain him, no obstacle impede his progress in the path of perfection; but he will proceed from virtue to virtue, and from felicity to felicity.

In spring all nature seems to rise out of sleep, to praise its Divine Author, and all the inhabitants of the air unite in a universal hymn to glorify the Being who has formed them. So, in the morning of the resurrection, similar songs shall be chanted by the elect of God. Comparing the greater with the less, we are naturally led to exclaim, "If such be the charms and enjoyments of the earthly spring, what must be those of the new creation!

## MAY XXVI.

### *The Attractive Power of Bodies.*

We often see two bodies approach each other, without being impelled by any external force. The cause which produces this effect is called *attraction*, which seems to be one of the principal springs of nature. It is by means of this law, that fluids ascend in capillary tubes, and it is partly the cause of the circulation of the juices in plants, and even in animals. It is true, that the power of expansion in the air contributes its share to it, at least in plants; as a portion of air is found in the fluid which nourishes them. Vegetables are also provided with veins which imbibe the outward air, and at the same time help to draw up the juices: however, attraction is certainly the principal cause of this phenomenon. It is well known that the human body is a series of capillary vessels, in which the humours are continually in motion; and this motion is partly regulated by the laws of attraction. A great number of the phenomena we observe in the corporeal world have this attractive power as a principle; and it is by this, that the motion of the celestial bodies can be most satisfactorily explained. These enormous globes, separated from each other by immense intervals, must be united by some secret connexion, to form such a perfect whole as the solar system; and it is probable that the union of the celestial bodies, their direction, the law which prevents their

deviating from their prescribed course, with the motion of the planets and comets round the sun, all depend on the attractive powers of that luminary, and on the gravitation of the bodies which incline towards it. How admirable is that wisdom, which, by means of the same law, produces the vegetation of a blade of grass, and the motion of the whole system of the universe!

These reflections should lead us to adore the Supreme Wisdom. If it appear in the celestial bodies, it is no less visible in the government of rational creatures. The Creator acts, in this respect, upon principles equally wise, according to the same laws, and accomplishing every thing with the most wonderful simplicity; but we are not always sensible of this, because we do not think any thing worthy our attention that is not strikingly great. But why should we not acknowledge in things which appear to us of little importance, the traces of wisdom which are so evidently impressed upon them? When cities and countries are swallowed up by earthquakes, destroyed by fire, or overwhelmed by water; we become attentive, and acknowledge, in such revolutions, the work and the providence of the Ruler of the world. But are extraordinary events alone capable of reminding us of the wisdom and justice of God? Does not his greatness appear as conspicuously in the smallest blade of grass and in the meanest insect, as in the motion and harmony of the spheres? Yes, in the small, as well as in the great, God manifests the glory of his attributes. It is through inattention or neg-

ligence, that we do not every where see it, even in the smallest beings, and most trifling events. To be convinced of the wisdom and goodness which preside in the government of Providence, we have no occasion to go to remote objects; we need only dwell on what relates to ourselves, and to the particular dispensations of God in this respect. Our own lives, and the events with which they are marked, may teach us how wise the methods he has chosen to make us happy; how many little circumstances his providence has caused to concur towards the execution of his designs; and how numerous the means he makes use of to preserve us from evils, or to procure us blessings!

## MAY XXVII.

*Complaints of Mankind relative to certain Inconveniences in the Laws of Nature.*

"WHY is the human body, from its constitution, liable to so many infirmities and accidents?" Whoever asks this question, let him first determine how it is possible to form a body which unites more advantages in itself than that which we have received from our Creator. It was incompatible with nature, and the chain of things of this world, that man should have an invulnerable body. If one of our fellow-creatures be deformed, another lame, a third deaf or dumb, is this a reason to murmur against God? are those defects

so common as to give us reason to complain? If, after these questions, any one should still think he has reason for discontent, let him reflect on the following truths.

It is of use to men in general to have some examples of the defects to which the human body is liable; for, when a person, perfect and well made, compares himself with one that is crooked and deformed, he is sensible of all the advantages of well-formed limbs, he learns to value properly a gift till then unthought of, and to take more care of its preservation. How valuable is each eye, each ear, each organ of sense, each joint, each limb, if we only observe the condition of the few people who are deprived of them! Would any of us part with a limb in exchange for the greatest treasure? Are not our bodies more beautiful and regular than the finest building, or the most curious machine? And though the latter are very inferior to them, we are far from attributing the assemblage of their parts to chance.

"Why are the countries of the earth so different from each other; sometimes cold, and sometimes damp, sometimes low, and sometimes high?" O man! if thou hadst the power to form a globe, wherein every thing should contribute to the advantage of men and animals, would thy understanding furnish thee with a plan more excellent than this? The countries of the earth, by reason of their diversity, produce a variety of exhalations and winds, which occasion that mixed air which, experience shows us, is best calculated

for the health and comfort of men and animals, and for the propagation and growth of plants.

"It is, however, allowed, that the variations in weather are not beneficial to all men, or to all countries." But, has not the preceding weather influenced the following, as the climate of one country often influences another? Are we capable of judging of the whole? Must a million of farmers sigh in vain for a shower, because dry weather would suit the private convenience of one family? A certain temperature of the air may occasion, here and there, a transient barrenness; but, can it be called an evil, if it be necessary in order to hinder the air from corrupting? Should an east wind (which is favorable to a whole country) cease to blow, because its violence may cause some shipwrecks, or be hurtful to some consumptive people? Is it reasonable, when we cannot take in the whole, to find fault with a part?

"But why are there so many noxious animals?" Does the objector think that no rapacious animals should exist upon the earth? Let him recollect that these very beasts of prey restrain the number of animals that might otherwise overpower us; and it is because many animals serve for food to beasts of prey, that the numbers of living creatures increase every year. If ravenous beasts did not exist, the carcases of animals, on which they feed, so far from being useful to living creatures, would be injurious. Animals thus devoured, are replaced by others; and, in most cases, population depends upon the quantity of sustenance. Hence

gnats, and other insects, would soon want food, if the animals which prey on them did not prevent them from multiplying too fast.

"Why has the Creator regulated the course of nature by such invariable laws?" It is precisely by means of this regulation that man's experience and labour enable him to make use of his understanding and powers, so as to be, in some measure, master of his own welfare. Could we desire to inhabit a world where, when we were hungry, we had only to wish, and we should be satisfied? where our clothes should fall from the clouds, if, when travelling in a cold night, we neglected providing any? or where we might at pleasure walk sometimes on the ground, sometimes in the water, sometimes in the air?—a world where the stomach would never be overloaded with the weight of food? where an iron hatchet would swim, if, by accident, we let it fall in the water? where bodies, going out of their natural direction, should describe an oblique line, lest their fall should hurt any body? Could we wish to inhabit a world, where we should have no occasion to do any thing? where we could not in any way promote our own pleasures? where there should be no rule, no fundamental law? where, in fine, the best, the bad, the worst, being equally unknown, nothing could make us attend to the laws of nature?

There will ever be a number of things in nature, the purposes of which, and their relation to the whole, must ever be concealed from us. We shall always find some, which, to our limited under-

standings, will appear contradictory and ill-adapted to the plan of the Deity. But, on all occasions, let us rest on this principle, that God does every thing for wise and beneficent purposes. And when these enigmas, these inexplicable things, present themselves, let us say, with the apostle, "Oh! the depth of the riches, both of the wisdom and knowledge of God! how unsearchable are his judgements and his ways past finding out! Who hath known the mind of the Lord, and who hath been his counsellor? For of him, and through him, and to him, are all things: to whom be glory for ever, Amen*."

## MAY XXVIII.

*Sins we are apt to commit in Spring.*

Is it possible that we can profane, by sin, a season which is peculiarly calculated to animate us to the practice of piety? Would it not be natural to suppose, that, in these days of spring, each field would be to us a temple, where we might offer up to our Creator the pleasing sacrifice of praise and thanksgiving; where each thought, each sentiment, and action, would tend to his glory? But, alas! we daily witness the ingratitude of men towards their heavenly Benefactor: they see nature renewed; they behold the flowers and a thousand other delightful objects, without thinking of him who made all these things, or, at

* Romans, xi. 33, 34. 36.

least, without returning him thanks for the wonders of his goodness. This vice of ingratitude particularly prevails at this season; and is often the fruitful source of many others. Man is the only creature on earth insensible to his own happiness; and yet he has the faculty of feeling it to its utmost extent. This is addressed to the ungrateful and insensible heart. But what attention can be expected from those who pay so little to God, who speaks throughout all nature with a voice so intelligible and energetic! Yet how is it *possible* to forget the Creator? All his works proclaim him; and we can neither know ourselves, nor the world we live in, without knowing him. Every creature reminds us of its Maker; each part of the vast scene of nature is filled with the Deity. He shows himself in each blade of grass—each flower and every bud. He constantly borrows the mild and persuasive language of nature, and addresses himself to our senses, our reason, our conscience, and all our faculties. Let us only listen to this language, and we shall no longer remain insensible or ungrateful.

How ought we to employ these fine days of spring? Let us visit our fields and gardens, that we may inhale the salubrious air, and contemplate the beauties of nature; but let us beware of abusing them by giving way to extravagant pleasures, which lead to folly and repentance. We shall not truly enjoy this charming season till, by fixing our attention on the works of our Creator, we discover his divine goodness and power: then will our hearts experience joys infinitely su-

perior to the pleasures of those who forget their Maker. It is for such contemplations only that we are endowed with reason and sensibility.

Let us now turn our attention to those who, at this season of the year, give way to too much care and anxiety. When, in the depth of winter, and oppressed by many wants, they became anxious and melancholy, they deserved some indulgence; but, at this time, it is altogether unpardonable to doubt the care of Providence. Behold the lilies of the field, how they grow: consider the fowls of the air; they sow not, neither do they reap, yet your heavenly Father feedeth them. Spring is the season of hope; give it admission to your hearts. Let the pleasures which nature now lavishes upon us, lead us to rejoice in the inestimable advantage we have over so many millions of living creatures—of knowing God to be the author of all happiness!

## MAY XXIX.

### *The Harmony and Patriotism of Bees.*

HARMONY and patriotism are indisputably the foundation of that happiness which, in some measure, may be ascribed to bees, and without which their republic would soon be annihilated. Those who have made observations on this subject, inform us, that, when these insects return to their hive, loaded with materials for building, they find some of their companions ready to relieve

them from their burden. The travellers begin their journeys again: and, while they are gathering more materials, the labourers who remained in the hive knead together the little the others had brought, and thus prepare a mass proper for their purpose. Some who are not immediately employed in building, are busied in carrying food to the labourers, and in rendering them other kind offices, that the work may go on without interruption. This harmony nearly resembles the patriotism which is also observable amongst bees. The riches of the state are the riches of each citizen; and this numerous republic consists only of one family. Here there is no self-interest, no avarice, and consequently, no rapine. Here the bees never assemble together to use violence, or to fight with their fellow-citizens. Here no bee is ever found ambitious of acquiring superfluities, while another is in want of necessaries: nor do they ever strive to acquire more honey when they have laid up a sufficiency of provision for the winter.

Insignificant as these insects may appear, they may still teach us virtues on which the repose and happiness of our lives depend. In whatever rank or condition we are placed, it is necessary to act in concert with our fellow-creatures as patriots: the society in which we live, Christianity, and our own happiness, require it. Let each of us, therefore, cheerfully bear our part in the general burden; and, if it be necessary, let us even take upon us the burden of others, who, through ignorance or weakness, may be deficient. And if

it happen, that religion, duty, and conscience, require us to make great sacrifices for our brethren, let us not consider this as an evil: but rather esteem it an honour that we are capable of labouring with greater zeal and success than others. Let no vile selfishness ever find room in our hearts: for those who seek to enrich themselves at the expense of others, are contemptible members of society. When we can in any way contribute to the general good, let us not be deterred from it by the fear of receiving no reward: the testimony of a clear conscience and the blessings of eternity, are sufficient recompense. It is too true, however, that one of the greatest evils of life is a want of harmony among the individuals of the human race; for there is, in reality, no such thing as perfect agreement in sentiments and characters: but even this ought to make us admire the wisdom of Providence, which, notwithstanding the disunion and disorders in the world, notwithstanding the self-interest which governs mankind, still keeps up society, and makes it flourish. When a pilot knows how to direct his ship, so as to avoid the sand-banks against which it might be driven by the waves, we naturally admire his skill and experience; and when we see, notwithstanding the wickedness of mankind, in the midst of the storms of passion, that wisdom and virtue are still preserved, we should admire the infinite wisdom of Him who governs the world.

## MAY XXX.

### *The prodigious Number of Plants on the Earth.*

ABOVE twenty thousand different species of plants have been already observed, and new ones are daily discovered. By the help of the microscope, some have been found where they were least expected. Mosses and sponges have been classed among vegetables, and have discovered to the virtuosi flowers and seeds before unknown. Free-stone is often covered with brown dark spots, and the same is seen on the best polished glass. This mouldy substance adheres to most bodies; and may be considered, as a garden, a field, or a forest, in miniature, where the plants, notwithstanding their extreme minuteness, have visible seeds and flowers. If we reflect on the quantity of moss which covers even the hardest stones and the most barren spots; on the quantity of herbs and grass; on the several sorts of flowers; on all the trees and bushes, each of which may be considered as an assemblage of a thousand different vegetables:—if to these we add the aquatic plants as slight and delicate as a hair, and most of which are still unknown; we may, in some measure, form to ourselves an idea of the multitude of plants upon our globe. It is particularly worthy of remark, that all these different vegetables grow up and are preserved, without detriment to each other; the Sovereign Disposer of all things having appointed to each species a place analogous to

its peculiar qualities. He has distributed them upon the surface of the earth with so much wisdom, that no part of it is destitute, nor do they grow any where in too great abundance. Some plants require to be placed in an open field, and not in the shade, where they would at least grow languid and weak. Others can only subsist in water, where the different qualities of the fluid matter occasion great variety. Some plants grow in sand, others in marshy and muddy places. Certain vegetables spring above the surface of the earth, others unfold themselves within its bosom. The different strata of which the soil is composed, sand, clay, chalk, &c. have each their particular vegetables; thence it is, that in the immense garden of nature there is no spot absolutely barren. From the finest sand to the hardest rock, from the torrid to the frigid zone, each soil, every climate, has plants peculiar to itself.

Let us attend to another circumstance peculiarly worthy of admiration:—The Creator has wisely ordained, that, among this immense variety of plants, those which are most proper for food or medicine, either for men or animals, grow in greater abundance than those which are of less utility. Herbs are much more numerous than trees and bushes, grass is more plentiful than oaks, and vines are more abundant than rose-bushes. By this arrangement, the Creator has evidently designed the general good: for had the reverse been the fact—had there been more oaks than grass, more trees than herbs and roots, it would have been impossible for animals to have subsisted,

and the surface of the earth would have been deprived of its most interesting charms!

In these cheerful days of spring, let the numerous vegetables which adorn the earth excite our souls to glorify the goodness of our Creator. Wherever we go, we walk on flowers and herbage, and as far as we can extend our views we discover the blessings of Heaven in every fertile field and meadow. Had every blade of grass the power of praising its Divine Author, how many millions of hymns would ascend from a single lawn! But the tribes of the vegetable kingdom have no need of language: their interesting dress, their immense numbers, and the advantages they afford to men and animals, sufficiently proclaim the goodness and power of their Maker.—Convinced of this truth, may we contemplate their excellencies with a becoming sense of gratitude to our God.

Almighty and most merciful Being! in this also does thy wondrous providence appear. It requires no effort of the mind to comprehend that thou art great and good: we need only contemplate thee in the immense world of plants.

## MAY XXXI.

### *The Plurality of Worlds.*

It is not so much through ignorance, as through self-love and pride, that we conceive *our world* is the only habitable part of the universe; that the sun was made merely to communicate light and heat

to us, and that the moon and stars are of no other use but to brighten our nights, and show the traveller his way. The contemplation of the fixed stars is sufficient to confute this ridiculous opinion.

Their sparkling appearance demonstrates that they shine by their own light, and from their being visible to us, notwithstanding their immense distances, we may naturally conjecture them to be much larger than our sun. Is it, then, probable, that these celestial bodies, which are not luminous specks, but great suns; these numberless bodies, placed so far from our globe; should not have been created for better purposes? If they were only designed to serve as nocturnal lights to us, they would be of no use the greatest part of the year. The cloudy atmosphere which often surrounds us, together with the short nights which are bright enough without their assistance, would render them useless. Those stars, also, which the naked eye cannot discover from their great distance, would be absolutely of no use; and the purpose ascribed to them would be better supplied by one single star nearer to us, than by so many millions at that distance. As the same reasoning may be applied to every use the stars are of to us, either in navigation or any thing else, it must be allowed, that we could not possibly account for the designs of those numerous suns, if no creatures, except those of our own globe, profited by their light and heat, nor unless they themselves served as habitations for different beings. This conclusion will appear still more natural, if we reflect attentively on the solar system. We

have already observed, that the moon, in many particulars, resembles this earth: that there, as well as here, land and sea, mountains and valleys, islands and gulfs, are to be seen. Such affinities as these authorize us to conceive others; and to suppose, also, in the moon, minerals, plants, animals, and rational creatures. The analogy between the moon and the rest of the planets, leads us to form the same conjectures of *them:* and as each star has to all appearance, like our sun, its particular planets; and as these undoubtedly resemble ours: we, in a manner, behold around us an innumerable multitude of worlds, each of which has its peculiar laws, arrangement, productions, and inhabitants. How numerous are the works of God! How glorious the starry sky! How great our Creator! Millions of worlds declare his glory; and the intelligent beings they contain acknowledge and adore their Maker. How forcibly does this incline us to join with the heavenly choir, in singing his praise, that it may resound over all the universe! How happy the prospect that opens to us, of that future state wherein we shall be acquainted with these worlds, and able to comprehend the wonders of them! How great will be our astonishment in discovering objects quite new to us, or at least very imperfectly known! In what splendor will the divine perfections appear, the power of which extends over a multitude of worlds, while some falsely imagine it reaches only to the little globe we inhabit! What endless subjects for glorifying the Creator and Ruler of all these worlds!

*Hymn for the Commencement of Summer.*

INFINITE Creator! when, in adoring thee, I contemplate thy power, thy wisdom, and thy providential care of every living creature, I know not how to express the praise I owe to such a Father and such a God.

Wherever I look, whithersoever I turn my eyes, I perceive and acknowledge the wonders of thy power; for all creation announces it with united voice.

Who has stretched out the azure canopy of heaven? Who has suspended the sun in the ethereal expanse, and called the stars by their names? Who has prescribed to the wind that measure of strength which directs its blowing? Who has commanded the clouds to pour their treasures upon the earth? It is thou, O God of majesty, whose goodness reacheth unto the heavens.

Thou, O God, restrainest the impetuous fury of the waves: the pealing thunder subsides at thy command; and in obedience to thy will, the trees are clothed with verdure or enamelled with blossoms. Thou supportest the stupendous mountains, and thine infinite skill hath suspended the earth upon nothing.

The splendor of the sun, the solemn gloom of night, and the rude violence of the tempest, proclaim thy matchless grandeur. All nature invites me to glorify thy name. Rocks, hills, and seas; the meanest worm, and every blade of grass, unitedly exclaim, " Give glory to the Creator!"

How immense are thy works, O God of power! how conspicuous art thou even in the minutest objects! The animal which is too small to be perceived by the naked eye, is clothed by thee with flesh, bone, and nerves: by thee it exists, and its preservation is the effect of thy bounteous goodness.

*Man* is thy image upon earth—his soul, his sense, his organs, his all—are a series of wonders! Capable of being united tothee by faith, and formed for eternal life, how can we be sufficiently grateful for such amazing favours!

O my soul, sing hallelujah to Him who redeemed thee on Calvary, and thus obtained for thee the privilege of everlasting life. May thy faith and hope daily increase, and produce the fruits of pious gratitude. Let the universe combine with me to bless and adore my God; and let all that hath understanding adore his name, and serve him with reverence!

## JUNE I.

### *Difference between the Works of Nature and those of Art.*

When we compare the works of nature with those of art, we find that the former have a decided superiority over the latter. The mere consideration that the productions of art are only *imitations* of nature, will suffice to prove this truth beyond a doubt. What artist is there that

does not wish to come as near to nature as possible, and flatter himself he has succeeded, though, in reality, very far from it? He is not able to invent; and all he does must have been taught him by nature. Nature, is rich and various; art, is poor and uniform. In the vast kingdom of nature we find an inexhaustible treasure; and any one of its parts—a stone, a plant, an animal—affords us so many objects worthy of admiration, that, in examining them with the utmost exactness, even to the smallest particle, we cannot discover the slightest imperfection. The works of art, on the contrary, are soon exhausted: for, on examining them with critical nicety, we soon lose the admiration they at first excited, and discover faults and imperfections not thought of before. What are the most celebrated statues, in comparison of a single animal, insect, or worm? Nature is able, of herself, to produce the greatest master-pieces; whereas art borrows from her whatever may be termed beautiful, having nothing of its own. Nature, therefore, has the first claim on every thing which art possesses.

Let us add to this, that the works of art are far less durable than those of nature. When the former have been long destroyed, the others still subsist in all their primitive beauty. How superior the interior construction of the productions of nature to all the works of men! Compare, for example, the most ingenious machine to the mechanism of animals, and we shall be struck with admiration at the sight of the miracles of nature, whilst the master-piece of art will appear a mere bauble.

Let us only consider ourselves with attention. The perfect and regular construction of our muscles and arteries; the wonderful circulation of the blood in our veins; the variety and number of movements in our limbs;—what proofs do they afford of the magnificence of God's works; and how poor and trifling, in comparison, are the productions of man!

It would be easy to extend these remarks, if what has been said were not more than sufficient to teach us the just value of the works of nature. It is true, that self-love carries us so far, that we are but too apt to perfer our own works to all others; and our taste is so depraved, that we look on every thing with disdain and indifference in which the industry of man has no share. Both these, however, prove our ignorance and ingratitude. Would it not be unjust to set less value on a watch, admirably finished by a great artist, than on a snow-ball made up by a child? In thus robbing the ingenious workman of the honour due to him, should we not prove, at the same time, our own ignorance and folly? This is exactly our case, when we do not properly distinguish between the works of nature and those of art. It is true, we ought not to despise the productions of art, for they also have their value; but, on the other hand, it would be absurd to consider them as equal, and still more so to prefer them to the works of nature, which are infinitely superior. God made his works so perfect, that through them we might acknowledge his power, wisdom, and goodness. Let us therefore

faithfully fulfil this great duty, and never give up the contemplation of nature, nor forget the effect such researches ought to have upon us. Let the study of nature be our delight, because it will teach us more and more to know the Creator and Ruler of the world, and will continually excite in us a desire to arrive one day at a more perfect knowledge of his works than we can acquire in this present world.

## JUNE II.

### *Leaves of Trees.*

THE leaves of trees form one of the greatest beauties of nature. Our impatience to see them bud in spring, and our joy when at last they appear, prove sufficiently that they are the ornament of our gardens, fields, and woods. How great is the pleasure we enjoy, in the sultry days of summer, from the refreshing coolness of their shade! Yet, this is the least of the advantages which accrue to us from the foliage of trees. We need only consider the wonderful construction of leaves, to be convinced that they were designed for much more important purposes. Take the trouble to examine the first that falls in your way. Every leaf has certain vessels, which, being closely compressed at the extremity of the stalk, extend themselves, like ribs, within the leaf, and branch out in various directions. There are no leaves that have not extremely fine vessels, and

an astonishing number of pores. For example, it has been observed, that, in a sort of box-tree, called *Palma Cereris*, there are above a hundred and seventy-two thousand pores on one single side of the leaf. In the open air, the leaves turn their upper surface towards the sky, and the under towards the earth, or towards the interior side of the plant To what purpose would this particular arrangement be, if leaves were of no other use but to adorn trees, and to afford us an agreeable shade? Most certainly the Creator had something much more important in view.

The nutrition of plants is carried on particularly by the leaves; as their pores serve to imbibe humidity from the atmosphere, and to communicate it to the whole plant. What wisdom appears in this organization! By this means, plants, in dry seasons, do not run the hazard of perishing for want of moisture: they receive abundance of refreshing dew, which, falling from the upper leaves, waters the lower ones; so that all receive a portion, and none of the nutritious juice is lost. It is found by experiments that plants perspire to a considerable degree, and the leaves appear to be the chief organs of this function. They also serve to introduce a necessary quantity of air into the interior of the plant; and they evidently contribute to the preservation of the buds which are to bloom the following year: hence many trees, when stripped of their foliage, wither and die. This sometimes happens to the mulberry tree, when it is stripped, without proper caution, to feed silkworms; and this is the reason

that grapes do not ripen when the vine has been divested of its leaves in the summer.

Another remark may be made on this subject, in order to illustrate the manner in which plants acquire their gradual growth. The lower surface of a leaf which is turned toward the earth, is always of a paler colour, and more rough and spongy than the upper side. Here again we discover the wisest contrivance: the side of the leaf next the ground has more asperities, and, consequently, more pores, that it may the more effectually imbibe the dew which is exhaled from the earth, and afterwards distribute it with more facility and abundance to the whole plant. The leaves, therefore, turn to that part whence they receive the most nourishment; and this is the reason that the leaves of some plants hang very low down. If we observe the trees which grow on steep mountains, we shall find that their leaves do not take a horizontal direction, but a perpendicular one; which proves that they direct themselves to that quarter whence they may receive most nourishment.

These reflections afford us another opportunity of admiring the wisdom of God; and should induce us to consider the leaves of trees hereafter in a different light from what we have hitherto done. Were we ignorant of the inimitable art of their construction, or the important purpose of their existence, it would not be wonderful that we should see them with neglect and indifference: but when we know that each leaf is a masterpiece of Divine Power, and an organ of fertility,

it would be unpardonable to regard them with inattention. They ought naturally to lead us to the following useful considerations:—Every thing, even the least object in nature, has been planned by the wisdom of the Creator. Not a single leaf is created merely for ornament: it contributes its share towards the fertility and support of the vegetable kingdom. If each leaf, then, be a master-piece of Divine Wisdom, what wonders does a single tree present to our eyes! The faculties of our minds cannot comprehend one of these miracles; and the smallest leaf may afford subject for reflection as long as we live.

## JUNE III.

### *The vivifying Power of the Sun.*

I MYSELF feel this beneficent power. As soon as the sun rises over my head, it fills my soul with serenity and joy. Its splendor and warmth inspire me with spirits and activity sufficient to fulfil the duties of life, and to enjoy the charms of society. The involuntary indolence and lowness which made me inactive in winter, have been gradually dissipated. I breathe more freely, and employ myself with greater pleasure. How can it be otherwise, when I witness the universal joy which the sun communicates to the world, and every where perceive its enlivening power? He animates and revives all creatures with his benign influence; millions of shining insects awaken,

sport, and bask in his rays; the birds salute him with their melodious concerts; every thing that breathes, rejoices in his presence; and we every where trace his beneficial effects. He causes the sap to rise and circulate through trees, plants, and vegetables; he causes the leaves and blossoms to shoot; he diffuses life and light throughout all nature; and he is the source of that warmth, without which every animal would languish and die. The influence of the sun is not only felt on the surface of our globe, but even in subterranean caves, where it gives life to animals and produces metals: it penetrates even into the highest mountains, though composed of rocks and stone; and extends even to the bottom of the ocean, where it acts in a variety of salutary ways.

When we reflect on these effects of the sun, it is natural to think on the miserable condition we should be in, if we were deprived of the light and heat of that celestial body. Without him what would our globe be but a lifeless mass, alike destitute of order and beauty? The trees could not produce leaves, nor the plants flowers; the fields would be without verdure, and the country without harvests: all nature would assume a gloomy and mournful aspect.

Such precisely is the condition in which the moral world would be found, were it deprived of the vivifying grace of Jesus Christ. Had he not brought life and immortality to light by his blessed Gospel, we should all have been completely buried in the clouds of ignorance, or the gulf of despair. Without the animating power of his

grace, we should bring forth no acceptable fruits; but the rank weeds of vice would rapidly spring up, and choke every seed of virtue and piety. Whither could we have fled for consolation or felicity, if the adorable Redeemer had not procured them for us by his humiliation and intercession? Sitting in the valley of the shadow of death and bound with chains, we should have groaned for emancipation without effect. Surely then our hearts should expand with the most grateful joy and exultation when we reflect on the inestimable blessings bestowed upon us by the Sun of Righteousness.

The sun, in its reviving power, is the emblem of a truly charitable man. He also spreads joy and blessings around him; by him the oppressed heart is raised and strengthened, the afflicted are comforted, the ignorant are enlightened, and the poor relieved. Let us, endeavour to resemble this beneficent character. Let us, according to our different stations, share with our fellow-creatures the goods which Providence has bestowed upon us. Let us instruct, comfort, and relieve all we can. Thus we shall quit this world regretted and beloved; and thus shall our memories be blessed by our surviving brethren.

## JUNE IV.

### *The Desires of the Soul are infinite.*

LET us employ a few moments in reflecting on ourselves. The soul has certainly the first claim

to our attention: it concerns us nearly, and ought to be dearer than all the pleasing objects which this season so particularly affords. Whatever satisfaction we find in contemplating the corporeal world, it cannot be compared to that which we experience in reflecting upon the nature and faculties of the soul. The observation of external objects, such as the traveller meets on the road, is certainly agreeable to him, because he requires to be amused and refreshed through his pilgrimage; but that of spiritual objects leads directly to the blessed immortality we may expect, as citizens of the world to come. Let us, therefore, sometimes reflect on the desires implanted in our souls by the Creator. Experience proves, that our thirst of knowledge can never be fully gratified. We have no sooner made one discovery than we aim at another. Our desires are never satisfied; and when we obtain what we had most ardently wished for, we begin to form new wishes. The desire of acquiring greater and more numerous blessings accompanies us through the journey of life, and exists even in the moment of separation from all sublunary concerns.

What conclusion can be drawn from this, but that, as our desires continually extend into futurity without being ever fully gratified, there must be blessings beyond the limits of this present life? We are not, then, designed for this transient life alone, but for an everlasting one. Is it probable, indeed, that man should be the only creature on earth endowed with faculties, without having, at

the same time, the destiny for which those faculties were bestowed? that man should have an instinct, without the means of satisfying it, and be, in this respect, lower than the brutes? When a beast is hungry or thirsty, it generally finds means to supply its wants. We see the silkworm spin its cone, and shut itself up for its transformation: this would not happen if it were not designed for another state, in which it is to appear again under a new form. We see that birds lay eggs: would this be the case if these eggs were not to serve for the preservation of their species, or that of other creatures? if our existence, then, were to be confined within the narrow limits of this life, why should we have received inclinations and desires which cannot be gratified? why those faculties, which we could never make use of? No, certainly; our heavenly Father has not implanted endless desires in our souls to no purpose, much less to make them our tormentors.

Being of beings! our souls are capable of being filled with thy Spirit; we are capable of being united to thee for ever; we may be raised above all earthly things, and soar even to thee. Is it then possible that souls such as these should be annihilated? that we should have learned to know, to love, and to aspire to thee, in vain? For we are far from it here below; we know thee but in part; our love is yet faint and weak. It is impossible that all our happiness can consist in this. Surely all the blessings we possess upon

earth are only pledges and forerunners of the infinite felicity which awaits us hereafter.

This explains and reconciles every thing; and we may clearly see our future destination. We perceive it is not in vain that we wish continually to increase in wisdom and virtue, and to draw nearer unto God, the source, the origin, and model of all perfection. We see that the happiness we cannot enjoy here, or, at least, but for a short time, we shall possess to all eternity in a future state of existence. If we aim at perfection, we shall obtain it. No propensity, no desire, no faculty of the soul, was given in vain: they will all be fully gratified and employed in a blessed eternity. Let us, therefore, rejoice in the immortality of our souls. God himself has given us the sense of eternity. Let us not then dwell on visible, but on invisible things. In the midst of all the pleasures we here enjoy, of all our flattering hopes, let us aspire to those pleasures, hopes, and unspeakable blessings, which are reserved for us in a better world. Let us employ the noble faculties of the soul in aspiring to heaven, for which purpose they were properly designed. Let us preserve our souls, which were created and redeemed for immortality, from the seduction of the senses, that they may not be absorbed in trifling pleasures unworthy of them.

## JUNE V.

### *The Utility of Rivers.*

When we calculate the space which rivers occupy, we find they take up a considerable part of our globe. Some persons are discontented with this arrangement, and imagine it would have been more advantageous if there had been fewer rivers, and a greater proportion of land. But if they would only consider, with what wisdom the Creator has planned every thing upon our sphere, they would conclude, that rivers have not been diffused over the earth without good reason and essential use to men and other creatures.

In the first place, we may observe, that the water of rivers affords a very wholesome beverage. Spring or pump water, when it has remained long under the earth without motion, detaches, and carries along with it, or holds suspended particles of matter which may be injurious to health; but river water, which is continually evaporating, and constantly undergoing agitation, purifies itself from all these, and becomes the most salubrious drink for men and beasts. The utility of rivers, however, extends still farther. Is it not to them that we owe the neatness, the wholesomeness, and comfort of our houses, as well as the fertility of our fields? Our habitations are always unhealthy when they are surrounded by marshes or stagnant water, or when the want of water occasions a drought. By the proximity of rivers the atmosphere is

cooled and the earth is fertilized. What an astonishing difference between a country well watered, and one to which nature has denied this blessing! the one is dry, barren, and desert; the other, on the contrary, is, in some sort, a garden of delights, where woods and valleys, fields and meadows, present a thousand beauties, and the most pleasing variety. A river meandering through a country carries with it health, prosperity, and abundance: it not only irrigates the plants, but also fertilizes the earth by its constant evaporations and inundations. Who can be so inattentive or ungrateful as not to acknowledge how useful rivers are to whole countries, when we daily derive such numberless advantages from them? Commerce could not be conveniently carried on unless our merchandise were transported, through the medium of rivers, from distant countries. Without their assistance, mills and other pieces of machinery would be stopped; agriculture would be impeded; and the tables of the luxurious be deprived of some of their greatest delicacies.

It may be said, that if there were no rivers, we should escape those inundations which sometimes occasion considerable damage. When they overflow their banks, they may certainly produce much havoc and devastation in flat level countries. But is this inconvenience sufficient to prevent rivers from being a blessing of Providence? Are not the innumerable advantages we derive from them far superior to the mischiefs which they sometimes occasion? Inundations

happen but seldom, and extend only over a small tract of country. Besides, whatever ravages they may cause in the inundated countries, they ultimately produce much good, by enriching and manuring the ground; and therefore they prove, to an attentive observer, that while God appears to chastise with one hand, he dispenses blessings with the other.

Thus, then, the rivers ought to convince us of that divine goodness which extends over all the earth. We see that every part of nature, and all the elements, combine to make us happy, and to procure us a thousand conveniences. If only one of the blessings of God failed us, that privation would destroy much of our happiness. If there were no rivers, there could be no fertility, and the earth would become a barren heap of sand. What innumerable multitudes of creatures are there which can neither live in the air nor on land, which would suddenly perish, if the Almighty hand, which created rivers, were to dry them up!

## JUNE VI.

### *Variety of Flowers.*

We cannot but be struck with astonishment, when we consider the prodigious number of flowers produced in spring, summer, and autumn. But the *variety* amongst this numerous tribe is, perhaps, still more surprising. Certainly, nothing but a Divine Power could cause such numbers

to grow; while this power must have been united with wisdom equally great, to produce such infinite variety. If they had all been perfectly alike, the sameness would have fatigued the senses; and if summer produced no fruit or flowers but such as spring affords, we should soon be weary of contemplating them, and of bestowing on them the care and cultivation which they require.

It is, therefore, a proof of the divine goodness that the productions of the vegetable kingdom are so agreeably diversified, and that such novelty of charms is added to their other perfections. This variety does not only extend to whole *tribes* of plants, but also to individuals. The carnation differs from the rose, the rose from the tulip, the tulip from the auricula, and the auricula from the lily; but each carnation, rose, tulip, lily, and auricula, has also its own particular beauty and character. Every one has something peculiar to itself. There are not two flowers of the same species perfectly alike in form and shades. Take a view of a bed of flowers in a parterre: some are of an extraordinary size, and seem to reign over all the rest, others are of a middling rank; some bear their stately heads above the height of man, others creep upon the ground; some exhibit the most dazzling colours, others are simple and make no show; some perfume the air with exquisite odours, whilst others only please the sight with their beautiful tints. The variations in flowers are not less remarkable in the different seasons of the year. In spring, when men leave the cities, in order to go and view

the productions which a bountiful Creator grants for their subsistence, they see the blossoms in full splendor and beauty. Towards summer, when the attention is particularly led to sowing seeds, thousands of flowers present themselves to the sight, and form a beautiful scene. They succeed one another regularly, and in the order designed. When winter at last arrives, it brings other plants with it, which, though the ymay not please the eye, have their uses. If we observe the whole race of vegetables, we shall still find new and greater varieties. How vast a difference, and how many links do we discover between the grass which grows among the stones, and that excellent plant which affords us the best nutriment, and which is justly termed the "staff of life!" In plants which creep and twine about each other, what a difference between the ivy, which clings to the mouldering battlement, and the vine, whose fruit affords such delicious drink! Amongst the trees, what a difference between the wild plum-tree and the oak!

With what wisdom has God arranged all his works! This is the natural conclusion to be drawn from these reflections. How admirably is the whole plan of the vegetable kingdom formed, and how perfectly executed! In all his works, the *useful* and *agreeable* are united. For it is not merely to gratify our sight that he has formed plants so astonishingly different from each other. Each revolving month is marked with the divine goodness, and every gift affords our nerves new pleasures and our hearts fresh occasions of love

and gratitude. Had the proofs of our Maker's bounty been more uniform, our inattention might have admitted of some excuse; but as they are so interestingly varied, we are altogether unpardonable if we behold them with indifference. Let us therefore, in the presence of the whole creation, adore the Almighty Architect, with becoming sentiments of respect and veneration. In contemplating the surprising varieties in the vegetable kingdom, we are compelled to acknowledge that both his wisdom and his goodness surpass our comprehension. Let us no longer behold the diversified beauties of plants and flowers without adoring the Creator, and acknowledging his wisdom, power, and goodness.

## JUNE VII.

### *The Use of venomous Plants and Animals.*

Every thing on earth, considered separately, is good and wholesome; and, if any thing becomes hurtful, it is because we make a bad use of it, instead of that for which it was designed. Hence it is, that the food which preserves the life of one animal, destroys another; and that a plant, which, in some cases, is considered as poisonous, in certain circumstances is very useful and salutary. Hemlock, for example, was formerly considered deadly poison, but multitudes of experiments have lately proved that admirable cures may be effected by it. The multitude and variety of

vegetables which grow upon the earth is prodigious: but we must not imagine they were all created for the food of man: some are designed for beasts, others furnish us with dress and ornaments; some please our taste and smell; and great numbers are medicinal, and would be of the utmost service in many maladies which men and animals are subject to, if they were not adulterated. The same thing may be said of many living creatures, which, though dangerous to us, are very useful to other animals, either as food or medicaments. Many birds feed upon insects which are considered as noxious: domestic fowls, for instance, are fond of spiders: and storks and peacocks will feed upon serpents. If we also consider how many excellent medicines are composed of the most venomous herbs, nothing can be easier than to justify the wisdom and goodness of God in the formation of creatures which answer so many beneficial purposes.

The following reflections may further illustrate this subject.—The number of noxious plants and animals is nothing in comparison of the multitude of those that are of the greatest and most obvious utility. The Creator has also implanted a natural instinct in men and animals, which induces them to avoid whatever might be prejudicial to their nature. Mischievous beasts have a certain fear of man, and scarcely ever use their offensive arms against him unless they are attacked or provoked. Besides, the most noxious animals have evident marks and characteristics by which their dangerous properties are easily

known; that, by being warned, we may avoid or prevent the danger. The rattlesnake, the most dangerous of serpents, gives warning of its approach by the clattering of the rings in its tail. The crocodile is so heavy in its motions, and turns with such difficulty, that it is very easy to escape from it. Divine goodness has even so wisely disposed things, that the most dangerous and venomous animals furnish the antidote for their own poison. Thus the oil of the scorpion is an infallible remedy for its sting: a bee bruised and rubbed on the part, cures the wound it has made; and the fat of vipers is an excellent remedy against their bite.

Some persons are of opinion that it would be better were there neither noxious plants nor animals upon the earth; but such an idea is the mere result of ignorance and selfishness. If God have ordained that one creature should hurt another, it is for very wise purposes; and from this plan there accrue to us many important advantages. Several creatures which appear hurtful, are not really so, at least in certain respects: their poison, and even the organs they make use of to wound others, are absolutely necessary to themselves. One example may serve for all the rest: the bee often inflicts pain with its sting, but if this be taken away the bee can never be of any use afterwards. It is the same throughout all nature; that which appears hurtful, is, in reality, indispensably necessary. Wherefore, then, has man the presumption to decide what is useful or injurious in nature? Who can say it is

contrary to the wisdom of God that we should sometimes feel pain? Do not the most disagreeable things often procure us the greatest advantages? In general, it is certain, that natural things are only accidentally injurious, and if we receive harm from them, we may always blame our own imprudence.

## JUNE VIII.

### *The Perfume of Flowers.*

A THOUSAND pleasing, cheerful objects surround me on all sides. Every thing I see, every thing I hear, all the sensations which smell or taste can produce, contribute to my enjoyment or happiness. Every thing in nature combines, in this beautiful season, to fill my mind with the sweetest and purest delight, and to lead my heart towards God. Every object that excites my admiration, inclines me to look up to him as the source and giver of all my gratifications. Each blossom is a proof of his power, and a mark of his existence.

I will, at present, confine myself to the pleasure I receive from the agreeable and diversified odour of flowers. It would have been a great instance of God's goodness, to have pleased the eye alone by that wonderful variety which appears in the vegetable kingdom, but he has graciously added, to the other charms of flowers, that of sweet perfumes; and there is as much variety

in these odours as in the flowers themselves. Though we cannot exactly determine in what this difference consists, we perceive it sensibly in going from one flower to another. It is also remarkable that the smell is neither strong enough to hurt the head, nor weak enough to lose its pleasing influence. The particles which emanate from flowers are so extremely light and fine, and become so widely diffused, that they can produce no inconvenience. The effluvia from a single grain of amber can perfume an apartment twenty feet square and fifteen high; and the odour of the rosemary which grows in Provence may be perceived at sea, at the distance of twenty leagues.

But how is it that vapours which are exhaled from plants, can so easily reach the organs of smell? This must be partly attributed to the construction of the nose. It is composed of two cavities, separated by a partition. These unite by degrees, and end in one only, which reaches to the bottom of the throat, where there is a communication with the mouth. All this cavity is lined with a membrane, which is one continual series of nerves. These proceed from the brain, through a bone pierced full of holes, which, on that account, is called the *os cribosum* or sieve-like bone. The nostrils being wide at the bottom, and contracting gradually upwards, the odorous particles are accumulated towards the top, when the air is inhaled through the nose; and consequently the nerves are more powerfully affected by them. By these means we receive the impression of even the weakest odours. We may

also observe, that divine wisdom has formed bony plates, which stop the upper part of the nose, and which have a twofold use: they prevent any thing hurtful from entering into the breathing passage during sleep, or when we are unable to guard it otherwise; and they receive and support the ramifications of the olfactory nerves, a great number of the branches and filaments of which are dispersed on these plates; and by that means, these nerves meet every where the odoriferous corpuscles, which strike them when they enter the nose with the air.

How just is it, that we should bless and adore our Creator for these excellent arrangements! In this interesting season of the year, we plainly perceive that the sense of smelling is a real blessing, without which we should be deprived of half the charms of the vegetable kingdom. But do we appreciate this as we ought, or are we duly sensible of our Maker's kindness! Whenever we inhale the delicious odour of a pink or a rose, let us reflect on the bounty of that God who has, even in this particular, provided for our felicity. While we walk amidst our gardens, and respire a perfumed atmosphere, let us elevate our souls to *Him* who has established the mode in which we receive so many agreeable impressions. And while we contemplate the expanding flowers, which literally impregnate the passing zephyrs with their fragrance, let us learn, how desirable it is to diffuse around us the balsamic odour of good works, and to unite mental charms with personal accomplishments.

## JUNE IX.

### *The Multitude of Animals.*

NATURALISTS who have taken the trouble to calculate the gross number of animals on our globe, have discovered about four hundred thousand species. And, however prodigious this number may appear, it is by no means exaggerated. There is reason to suppose, that, in the known parts of the earth, there are, of land animals, more than four hundred and fifty species; of birds, six hundred; of fish with scales, two thousand; of shell-fish, three thousand; and of insects visible to the naked eye, more than twenty thousand; besides those which belong to various kinds of animals, amounting to near a hundred thousand species. There are also immense tribes of insects entirely unknown to us, which may be reasonably estimated at two hundred thousand. We must likewise take account of those insects which subsist entirely on plants; and as eighteen thousand varieties of plants have already been described, if we allow each to contain only four species of insects, the number of these will amount to seventy-two thousand! Such a number of animals living on our globe certainly appears prodigious; but it will not be found too much, if we believe, with some naturalists, that every part of the empire of nature is filled with animated beings. Very skilful physicians have maintained, that the disorders which are attended with blotches and pimples, and even certain fevers, are

occasioned by animalculæ. It is also probable, that the atmosphere is sometimes peopled with animals, although their extreme minuteness prevents them from being visible. And who can tell whether that tremulous motion observed in the air during summer may not be produced by millions of insects swarming in the atmosphere? Let us take the first flower that falls in our way—for example, a daisy or a rose—and we shall discover a multitude of insects, whose figure and various motions will amuse us. Is there the smallest spot in nature where living animals may not be found? Nature has even produced animals in others, and made one to be as a world for other creatures to subsist in. The air, the juices of animals and plants, corrupted matter, excrements, smoke, dry wood, and even the hardest stones, in some measure feed, and serve to lodge, living creatures. The sea seems to be an element composed of animals. The light which is observed on it in the summer nights, is owing to an innumerable multitude of little luminous worms; whose parts when divided from the body, and corrupted, still shine, as the worm itself did when alive. Whole swarms of animalculæ, which the eye cannot reckon, flutter and sport in the rays of the sun. And all these innumerable animals of our little globe are infinitely diversified in their form, organs, members, faculties and motions. Endeavour, O man! to name all these animals; undertake to express by numbers the individuals of one single species; attempt to calculate how many herrings, flies, worms, birds,

&c. there are. How could you do it! Their number is unknown; and, if it were not so, it would be impossible to express it by figures.

Here we have a fine subject for admiration, in reflecting on the infinite power of our Creator. He alone produced, and he alone preserves and supports, this immense multitude of creatures. Consider how much food such a number of animals require. If they only lived at each other's expense, if they destroyed one another, nature would present us with nothing but a frightful scene of murder and slaughter. But, happily, there are not many carnivorous animals; and these are very useful in devouring carcases, and, by that means, guarding us from infection, as well as preserving a certain balance, by preventing the different species from multiplying too fast. Besides, the Creator has wisely designed the vegetable kingdom for the food of animals; and he has assigned to almost every species of beasts a particular kind of plant. In order that all sorts of animals should find food in proportion to their number, he has ordained that they should live in the different countries of the earth. How exactly has he even measured the ground! A single tree is larger than several thousand plants; yet it occupies only a surface of a few square feet; and a multitude of quadrupeds, birds, and insects, dwell there, and are nourished by it. What concern has the Creator shown, in surrounding all animals with a fluid matter adapted to their different natures: two sorts of fluids are destined for them—the one water, the

other air. All living creatures are distributed through these two elements, except a few amphibious animals, which live partly in both. The bottom of these two fluids is the habitation of a part of those animals. Such as are in the upper fluid are reptiles, and most of the quadrupeds; and, in the lower sea, the zoophites, shell fish, corals, oysters, &c. Others have the power of ascending or descending as they please in their element; as the birds and insects do in the air, and as the whales and most other fish do in the water.

Does the atheist dare to say in his heart, *There is no God!* Senseless man! "Go and ask the beasts, and they shall teach thee; and the fowls of the air, and they shall tell thee: or speak to the earth, and it shall teach thee; and the fishes of the sea shall declare unto thee. Who knoweth not, in all these, that the hand of the Lord hath wrought this?"

## JUNE X.

### *Immensity of the Firmament.*

Approach, O man! and contemplate the firmament. Consider that multitude of brilliant lamps which illumine thy nights. Endeavour to count them; but thy feeble sight is incapable of doing it, and thy eyes lose themselves in the confusion of infinitude. Call to thy assistance the powers of the telescope. What dost thou

now see? To the first millions, new millions of worlds are added. Continue these observations, and undertake to count the stars thou hast discovered. Thy ideas are confounded: thou seest that it is beyond the power of numbers to express such immense multitudes.

It is true, that, for many ages mankind have endeavoured to ascertain the number of the stars; but the discoveries made in the heavens, since the invention of telescopes, plainly prove the difficulty, if not impossibility, of acquiring a satisfactory knowledge of this important subject. To count the stars seems to be as impossible as to reckon the grains of sand on the sea-shore. However, before telescopes were made, we could not discover so many as are now visible. One of the most ancient astronomers reckoned but one thousand and twenty-six; and this catalogue was afterwards increased to one thousand and eighty-eight. But the observations made since, by the assistance of telescopes, have convinced mankind, that the human sight cannot discover all the celestial bodies. By means of instruments we learn that the long and luminous tract in the sky, called the Milky Way, is composed of innumerable stars. We also know, that, in places where formerly we beheld but a single star, we now discover many, with the assistance of even a middling telescope. By this mean likewise, we now distinguish, in two constellations alone, twice as many stars as were formerly reckoned in the whole sky. How has this enlarged our ideas, in respect to the greatness of the universe! But if the

discoveries already made have so increased our admiration of the immensity of the divine power, it will rise still higher, when we reflect on the magnitude of these bodies, many of which, notwithstanding their prodigious distance, are visible to the naked eye. The most exact calculations inform us, that a cannon-ball shot off from the nearest fixed star, would be more than seven hundred thousand years before it could reach our globe; and yet the greatest astronomers agree, that these numbers are not sufficient to express the apparent distance of one of the fixed stars from our earth.

Some of these globes appear larger than others, because they are nearer to our earth, and on this account we call them stars of the first magnitude. Those nearest to them are called stars of the second magnitude, because, being much farther from us, they appear smaller: they must be at as great a distance from the former, as the latter are from us. Those of the third magnitude, must be three; those of the fourth, four times farther from us than the first, and so on. Supposing that there are only twenty of these different orders, it will follow that the diameter of the earth is so great that a cannon-ball could not traverse it in twenty-five millions of years. The distance of the fixed stars is too great to be computed. It is conjectured that Sirius, probably the nearest of all the fixed stars, is distant from the earth not less than 32,000,000,000,000 of miles; which is farther than a cannon-ball would fly in seven millions of years!

Sovereign Ruler of the universe! Father of spirits and of men! O that my ideas were vast and sublime as the expanse of the heavens, that I might worthily meditate upon thy greatness! that I might raise them even to these innumerable worlds, where thou displayest thy magnificence still more than on this earthly globe! that, as I now pass from flower to flower, I might there go from star to star, till I arrived at the august sanctuary where thou sittest on the throne of thy glory! But my desires are vain, while I am a sojourner upon earth. I shall not know the wonders of the heavens, till my soul is delivered from the encumbrance of this gross body. In the mean time, as long as I live in this world, I will sing thy praise.

## JUNE XI.

*Singularities in the Vegetable Kingdom.*

The difference between animals is so great, that at first view it appears difficult to find any resemblance between them and plants. Some creatures live only in water; others only on land, or in the air; and some can live equally well in either. And it may be said, literally, that it is the same in respect to vegetables: there are plants which only live in the ground; others in water; some can scarcely bear any moisture; others live equally in land or water; and there are even some which exist in the air.

In the island of Japan, there is a tree, which, contrary to the nature of all other plants which require moisture, cannot bear it. As soon as it is watered, it withers; and the only way to save it from dying, is to cut it down to the root, to dry it in the sun, and afterwards plant it in a dry and sandy soil. It is known, that a sort of mushroom, of moss, and other small plants, float in the air; but a more extraordinary thing is, that a sprig of rosemary, which was put into the hand of a dead person (according to the custom of some countries), took root so well to the right and to the left, that, at the end of some years, when the grave was opened, it had covered all the face of the corse with its leaves.

The vegetation of the truffle is still more singular: this extraordinary tubercle has neither roots, stalk, leaves, blossoms, nor even any visible seed: it draws its sustenance through the pores of its bark. But how it is produced, or why, in general, there should be no other herb where these sort of mushrooms grow, and the earth be light and full of crevices, has not yet been accounted for.

There is no plant which can be more aptly compared to amphibious animals than that sort of membraneous moss, called *nostoch*. It is an irregular body, a little transparent, and of a pale green colour: it trembles when touched, and is easily broken.

It is never visible in dry weather; but after rain it is found in many places, particularly in

uncultivated land, and on the sides of sandy roads. Such is the rapidity of its growth, that it seems to be formed almost in a moment; for when, in summer, walking in a garden, not a trace of it is to be seen, if a shower of rain descend, and the same place be visited an hour afterwards, the whole walk will appear nearly covered with it. For a long time it was supposed that the *nostoch* fell from the sky; but it is now known to be a leaf, which attracts and imbibes water with great avidity. This leaf, to which no root has been discovered, is in its natural state when impregnated with water; but heat, or a high wind, makes the water evaporate in a few hours, and then the leaf contracts, and loses its transparency and colour. Hence it appears to grow so suddenly, and to be produced in so miraculous a manner by a shower of rain; for when fresh rain falls upon it, though before dried and invisible, it is reanimated, and appears as at first.

It would be no difficult task to enumerate a variety of plants which bear a resemblance to animals; but there are other peculiarities in the vegetable kingdom which demand and deserve our attention. The whole atmosphere is filled with millions of invisible plants and seeds: even seeds of a larger sort are scattered by the wind over all the earth; and, as soon as they are thus transported to places where they may best germinate, they become plants, and often so little soil is necessary for this purpose, that we can scarcely conceive whence they derive the requisite degree of

nutriment. Hence we see large plants, and even trees, which take root and grow in the clifts of rocks, without the least appearance of earth.

Vegetation is sometimes effected with inconceivable speed: for example, if the seed of mushrooms and watercresses be put into wet linen, it will become a salad in twenty-four hours. There are plants which appear to have scarcely any life, and yet continue to exist. We often see willows not only hollow and decayed within, but the outer bark so considerably damaged that scarce an eighth part of it remains. These trunks however, poor as they are, bud out again every spring, and shoot into numberless branches and leaves. How wonderful is it, that the nutritive juice of plants is not only supplied by means of the root, but also by the leaves, which draw it from the air, and in some degree pump it in! and that there should be plants, the branches of which become roots, and the roots branches, according as they are turned in planting them! How surprising also is the great age to which some trees arrive! There are apple-trees which must be above a thousand years old; and, if we calculate in the gross the fruit which such a tree produces annually, we shall find that a single pippin might have furnished all Europe with trees and fruit of this species. So extensive is this subject, that, were we to attempt pursuing it through all its ramifications, it would lead to an almost endless train of reflections. All nature teems with wonders; and every thing leads to that infinitely perfect Being, whose wisdom, power, and un-

bounded goodness unite to pour blessings and enjoyments upon our heads.

Ungrateful as we are, shall we not reflect on the innumerable wonders that continually surround us? Can we refuse to bless that God who does such great and admirable things? Shall we not sanctify the pleasures which the country and gardens afford us, by contemplating the wonders of the Lord; by looking from the creature to the Creator; from the flower to Him that made it?

O Lord, how great and magnificent are thy works! What wonders present themselves on every side! I view them with astonishment, and am lost in the contemplation: they surpass my comprehension, and it is in vain that I attempt to fathom them. At thy command, the grass puts forth its tender blade, and the groves are clothed with verdure; the flowers embalm the air, and adorn the fields and gardens with their glowing colours; the umbrageous trees elevate their heads to the clouds, and the mountain cedar declares thy glory. On whatever side I turn, new wonders salute my eyes. The meadows, the mountains, and the valleys, the widely extended ocean and the purling rivulet, all, from the lowest atom to the highest sphere, combine to announce the goodness of the Lord!

## JUNE XII.

### *Means of Happiness found in Nature.*

To be convinced that, throughout nature, every thing tends to the benefit of mankind, we have only to consider the close connexion and relation between ourselves and all natural productions. It is true, there are several bodies, whose utility, with respect to man, we do not perceive; but we must not thence conclude that they are really of no advantage. Many things which were totally disregarded in the days of our ancestors, are now highly esteemed on account of their utility; and we may naturally expect that our posterity will discover many useful things, of which we are completely ignorant. In this, we should acknowledge the Divine Wisdom which has concealed from us the real use of many creatures, in order to humble our pride, by making us feel how limited our understandings are, and to exercise our minds in the contemplation of God's wonderful works.

Many things in nature are only indirectly useful to us: several animals serve as food for mankind, and consequently whatever tends to nourish them, is beneficial to us. Small fish are the food of the larger; many birds feed on worms and insects: and there are several species which live entirely by prey. The Divine Wisdom manifests itself again in this circumstance; for if the productions of the earth formed the sole nourishment of animals, there would not be enough left for

the use of man; and what would then be the fruit of his labour?

I allow that there are several animals which might be said to be created only to hurt mankind; for example, venomous creatures. Poison is so injurious to the human body, that it generally causes a painful death; and its effects are sometimes so quick, that there is no time to have recourse to antidotes. It is true, that, in this respect, many animals appear in a disadvantageous point of view; but, if we consider them in another light, we shall discover traces of God's goodness, and have reason to admire his wisdom. Physicians make use of poison in many excellent medicines. And can we suppose that mankind would have been happier if no venomous creatures had received an existence? The very poison which they carry is partly derived from noxious vapours which we could not have respired without injury. In a word, it may be said with confidence, that there is nothing on earth really hurtful to man, unless he make an improper use of it.

But if, in creating our globe, God proposed to himself our felicity, should we not be inexcusable to interrupt his salutary designs, by obstructing our own happiness, instead of labouring for it with all our might? God's designs towards us, are all merciful, but we often render them useless by a conduct which must necessarily make us unhappy. Let us be wiser in future, and make a better use of the different means of happiness with which God so abundantly furnishes us. And, as it is not possible to satisfy all our wishes in this

world, let us have recourse to religion, which will amply compensate for any defects in nature, and will explain to us many things which appear obscure. Let us ever remember and gratefully celebrate the wisdom and power of our Creator, and duly appreciate the means which he has vouchsafed to employ in order to lead us to felicity.

## JUNE XIII.

### *The Loadstone.*

Of all minerals, the loadstone is the most singular in its properties: it is a ferruginous stone, of a dark grey colour, and has the property of attracting iron. This virtue, however, is not equally diffused through the whole stone, but resides chiefly in two of its points, which are called its poles. When this stone is suspended by a string, and unconfined, it constantly points one of its poles to the north, and the other to the south, if first put in motion, and then left to itself. This regular direction, which only varies a little in some particular parts of the earth, has given the name of the northern pole to that which points to the north, and southern to that which points to the south. The two properties of attracting iron, and pointing towards the north, may be communicated to iron by rubbing it against the loadstone: and this discovery introduced the magnetic needle, so necessary to na-

vigators in long voyages. Hence we find, that many things which, at first sight, appear to be of little importance, may become exceeding useful to the world; and that, in general, the knowledge and study of the magnificent works of the creation are of infinite advantage to the human mind. These remarkable properties of the loadstone induced naturalists to examine it more closely, that they might be enabled to penetrate into the cause of such surprising effects, and also discover new properties in the stone. In the latter design they were more successful than in the former. They found that the magnet did not always, nor in all places, point exactly to the north; but that it sometimes inclined a little to the east, sometimes to the west, and that sometimes more and sometimes less. It was also observed, that its attractive powers were equally strong, though bodies were placed between the iron and the stone, which might be supposed to prevent this effect. Glass, fire, water, men, and animals, with every metal, except iron, give free passage to the magnetic effluvia. It was likewise discovered that the north pole of one loadstone attracts the south pole of the other, while the north pole repels the north, and the south pole the south. The attractive power is supposed to be as equally resident in the iron as in the loadstone, since the attraction seems to be mutual. To prove this by an easy experiment, we have only to suspend a loadstone at one end of the beam of a balance, and put an equal weight at the other end; when the balance is made perfectly even, place a piece

of iron under it, and the loadstone will be immediately drawn down by the iron, and the other weight will fly up. If their situation be reversed, the loadstone will attract the iron in the same manner.

However singular these phenomena of the loadstone may appear, it is equally surprising that all the sagacity and all the efforts of philosophers have not been able to discover the cause of these wonderful effects. The nature of the loadstone still continues to perplex the learned notwithstanding their most laborious researches. Let us not, therefore, be surprised that in *Religion*, which is infinitely elevated above all the objects of our senses, there should be found mysteries we are unable to explain in this finite state of existence, and the perfect knowledge of which is reserved for a future world. Is it surprising that some points in theology should be incomprehensible to us, when in natural things, which we see with our eyes, and feel with our hands, there are so many objects which oblige the most distinguished characters to acknowledge their ignorance, and the weakness of their understanding? There are, however, persons rash enough to doubt, and even to deny, whatever they cannot comprehend in religion. If this consequence were right, we might with much more reason assert, that the loadstone does not attract iron, or point to the north, and that all is false that is said of it, because we can neither explain nor comprehend it. When natural things are in question, we may say to such sceptics, "Come

and see;" but the mysteries of religion are only to be seen with the eyes of the mind, and can never be perfectly comprehended till the soul shall arrive in the kingdom of light. Let us wait for this happy period; and, if we find any thing obscure and inexplicable in religion, or in nature, let us remember, that the imperfect state of our souls and bodies prevent us from searching to the bottom of them; let us also remember, that a considerable part of the happiness of the world to come, will consist in having a more perfect knowledge of all that can contribute to complete our felicity, and to prove the glorious attributes of the Supreme Being. "There in the Fountain of light we shall have a clear and comprehensive view of every thing that appeared obscure or defective in this world; and our souls will be filled with gratitude and joy, on viewing all the different parts, connexions, relations, and universal harmony of the works of God."

## JUNE XIV.

### *Cherries.*

CHERRIES are a fruit, which, by their sweetness, mixed with a pleasing acidity, quench the thirst, allay the fever of the blood in the heat of summer, and prevent the bad humours to which we are but too liable at this season. In the first place, they quench the thirst by their sharpness, which contracts the glands, cools the parched

tongue, and moistens the dry palate. This method of quenching thirst, in hot weather, is preferable to drinking a large quantity of liquid, which only tends to increase our heat and perspiration. But, besides this property of quenching our thirst in the most pleasing manner, cherries have a cooling quality, which tempers the heat of the blood, and calms the animal spirits, whose too great impetuosity and agitation affect and weaken the nerves: thus the beneficial juice of cherries, by its acidity and astringent virtue, cools us delightfully in the great heats, prevents the blood from becoming too thin, thickens the fluids, and preserves them from putrefaction.

With what goodness has the Creator provided fruit adapted to every season! In this hot month we require cooling acid fruits, and he furnishes them in such abundance that the poor may enjoy them as well as the rich. Whenever, therefore, we see a cherry-tree laden with fruit, let us make this consolatory reflection:—How sad would be the fate of the labourer, who is obliged to earn his bread with the sweat of his brow, if, to refresh himself, he required those delicious beverages reserved for the sons of opulence, and could provide himself with no other! Merciful Father! thou forgettest not the poor; thou suppliest their wants; thou vouchsafest to refresh them with fruits within their reach; and the cherries are as grateful to them as the most expensive wines to the rich. What an abundance of acid and cooling fruits are produced in this season! Our gooseberries, currants, cucumbers, stone-fruit, and

salads, are so many pleasing preservatives of health.

Whenever we behold the fruit-trees and enjoy their productions, let us gratefully bless the bounty of our Creator, and indulge those reflections which naturally arise out of the subject. The heavens, the earth, the elements, and every creature, combine to make us happy. Wherever we turn our eyes, we are surrounded with the blessings of our Heavenly Father. Animals, corn, vegetables, and fruit, in the valleys, on the mountains, in the forests, and in the seas, all serve for our sustenance and enjoyment. The beneficent hand of the Most High is ever open to us. How great, indeed, are the blessings which God continually pours upon us! How many occasions have we daily to look up to Him with grateful hearts, and to bless him for all his mercies! Each time that we walk in the garden or in the field, each time that we enjoy the beauties and blessings of nature, let us think of him who is the source of every blessing and enjoyment.

## JUNE XV.

### *Wisdom observable in the Construction of Animal Bodies.*

The formation of the animal body affords the most striking proof of Divine Wisdom: for, as some animals were designed to reside chiefly in the air, others on the earth, and others in the

water, it was necessary that their construction should be conformable and adapted to their situation and different kinds of life.

The wisdom with which God has done this, cannot be sufficiently admired: every thing is so exactly disposed as each animal requires it, that if their construction had been like any other but their own, they would have suffered by it considerably, and could not have fulfilled their destination. Rapacious birds are provided with strong talons and sharp hooked beaks, that they may the more easily catch and securely hold their prey. Those which are to seek their food in marshy places, require a long slender bill and long legs; as it is necessary that those which live in water should have the lower part of the body very large, a long neck, membranes connecting the toes, to serve as a kind of oars; and a certain oiliness in their feathers, to enable them to glide along more smoothly. Insects that live on prey have mouths shaped like pincers; and those that suck their food are provided with a sting or trunk. Why have hares or rabbits such protuberant eyes, but in order to see and avoid the snares and dangers to which they are exposed? Why are the eyes of the mole so small and deeply sunk in the head, but that, living under ground, it does not require much sight, and because prominent eyes would incommode and hinder its burrowing under ground? Why is the crystalline humour in the eyes of fish so round, but to compensate for the refraction of the rays of light in an aqueous me-

dium; while animals which live in the air have their crystalline of a lenticular, or plano-convex form? Why have animals whose eyes are moveable only two, whilst those that cannot move theirs have many? Why is it that animals which seek their prey by night, have a large and brilliant pupil? And why does the eye of the hen answer the double purpose of telescope and microscope, but that she may seek the very smallest seeds in the earth or gravel, and discover at a distance those birds of prey which threaten to seize her young?

We are naturally struck with amazement when we consider the vast apparatus for the organs of animals in respect to their several motions. What a multitude of limbs! what suppleness! what flexibility! Some animals move slowly, others swiftly; some with two feet, others with more; some with both wings and feet, others without either. The slowness or swiftness of motion is always regulated according to the necessities of each animal: those that are well armed, and have courage, skill, and strength enough to defend themselves against their enemies, move more slowly than those that are defenceless. Who gave to serpents and other reptiles the power to contract and stretch out their bodies, to roll themselves up, and to dart out afterwards from one place to another to seize their prey? Who formed the fish in such a manner, that, by means of their air bladder, they can rise and fall in the water at pleasure? Who

taught the snail to contract its body, and bring water into its little house, when it wishes to fall on the ground?

Contemplating the feathered tribes, we are compelled to exclaim, What art appears in the formation of every part, and particularly their wings! How well is their body constructed for flight: small and sharp before, and gradually increasing till it attains its proper bulk. This adapts it for cutting the air, and making itself a passage through that element. The feathers are all arranged with much art, and laid over each other in regular order, to facilitate the motion of the body, and, at the same time, to serve as a covering and defence from stormy and inclement weather. Though close and strongly connected together, they are capable of erecting and extending themselves; of swelling out and forming a larger volume, as the necessities of the bird may require. The wings, which are the chief instruments of flight, are fixed in the most convenient place to preserve the equilibrium of the body in a fluid so subtile as the air; and every single feather is entitled to our admiration. The quill is stiff, and hollow towards the bottom; which makes it both light and strong: the beard of feathers is ranged regularly—broad on one side, narrow on the other; which is of wonderful use in the progressive motion of birds, as well as in the close and strong texture of the wings. What proportion do we see in the manner of placing the feathers! They are always so arranged as to agree exactly with the length and strength of each

feather; and the large ones serve to support the smaller. In the bony part of the wings, what a multitude of joints are there, which open, shut, and move, according as it is necessary, either to extend the wings or draw them close to the body! What extraordinary strength in the pectoral muscles, that the bird may cut the air with more rapidity! What incomparable art in the formation of the tail, which seems as a rudder to direct the flight, and enable the bird to ascend and descend in the air, and also keeps the wings and body properly balanced! How admirably are the legs and feet appropriated to their different motions! In some birds the claws are large, and furnished with membranes that extend and contract, for the purpose of swimming: in others they are sharp, and bent down at the point, that they may walk the firmer, perch, seize and hold their prey. In some the legs are long, that they may walk into and rake their food out of the water and marshes: in others they are shorter; but always adapted to their mode of living, and their respective necessities.

Who can seriously reflect upon this subject without acknowledging the supreme intelligence of our Creator and Benefactor? Is it possible, that things so wonderful, so regular, so admirably proportioned, should be the effect of a blind chance? Could any one be persuaded, that such a multitude of veins, joints, and muscles, should be put in motion, in each animal, without design? and that all the parts, even the smallest, should be connected with each other,

and perform their different offices with such perfect harmony and regularity? Ought it not rather to lead us to think of the Creator of all things, whose wisdom and goodness have placed so many creatures exactly in the circumstances most suitable to them? Let us, then, make use of all these objects to glorify our Creator; and let us seek true wisdom, by endeavouring to become more intimately acquainted with this great Being, who has so gloriously manifested himself in all the creatures formed by his hand.

## JUNE XVI.

### *The Dew.*

THE wise Ruler of the world, who continually watches over his children, and provides for all their wants, uses a variety of means to render the earth fruitful. Sometimes he effects this by inundations. It is true, that, when these lay countries waste, the farmer, who only thinks of the present, gives way to ungrateful murmurs; but, in the end, if their happy consequences for the general good be properly considered, it must be allowed they are very beneficial. Sometimes it is by a river, which, like the Egyptian Nile, has the singular property of overflowing its banks at certain periods, to water a country where showers never fall to irrigate the parched fields. Sometimes it is by rains, which fall more or less frequently, in order to cool the air, and water the

thirsty ground. But these means are neither sufficiently constant nor abundant; the most usual, certain, and universal, though, perhaps, the least regarded, is the dew. This inestimable gift of Heaven, which, even in years of the greatest drought, supports and preserves the plants from perishing, consists of those pure and brilliant drops which are seen in such profusion, morning and evening, on the leaves of trees and plants.

The dew does not fall from above, as was formerly imagined: it does not descend from the highest parts of our atmosphere; nor is it an exhalation from the stars, as superstition had supposed. This pretended celestial origin has probably given rise to the folly of some alchymists, who hoped to convert dew into gold. It is now generally allowed, that dew is nothing more than a vapour, which, during the warmth of day, exhales from the earth and vegetable productions, and, condensed by the coldness of the night, falls in drops. To be convinced of this, we have only to cover a plant with a bell-glass, and we shall observe a greater quantity of dew-drops collected upon its leaves than upon those which have been exposed to the open air. This certainly would not be the case, if the dew fell from above, or if it did not rise from the ground.

Nothing is easier than to account for the formation of dew; for no one can be ignorant that the rays of the sun, and the heat which is diffused upon the earth, continually detach from all bodies a multitude of small particles; some of which rise into the atmosphere, and the rest col-

lect in the form of drops of water. This account of the dew explains how it happens that it is sometimes hurtful, and sometimes not so. Its nature evidently depends on the quality of the vapours of which it is composed. The wind carries off the light exhalations as soon as they are formed, and prevents them from falling in drops. This is the reason that there is most dew when the air is very calm. By this wise arrangement of the Creator, plants can vegetate and grow even in countries where there is no rain; for the soil in those places being sandy, porous, and very moist underneath, the heat draws out a great quantity of dew which encompasses the plants and supplies the place of rain.

These different methods which Providence uses to moisten and fertilize the earth, ought to remind us of those which Divine Grace employs to improve the barren heart of man, and to make it fertile in good works. Chastisement more or less severe, blessings of every kind, exhortations, warnings given us from the example of others, and a thousand other means, are made use of by our gracious God, to lead us to himself, to sanctify us, and to induce us to bring forth the fruits of righteousness. Sometimes, in the natural world, a violent storm falls from the clouds, deluges the fields, causes rivers and brooks to overflow their banks, and sweeps every thing before it. At other times God calls the soft dew from the earth, and, in a manner, imperceptibly grants the wishes of the farmer for rain. Thus also in the economy of grace he makes use of different

means to accomplish the merciful end he proposes. To many obdurate hearts he speaks in thunder and lightning, as formerly from the top of Sinai; while he calls to others with a voice milder than the evening zephyr, and refreshes their souls with the beneficent dew of his grace.

Let this conduct of our heavenly Father serve as a model to us. Let us employ all sorts of means to reclaim our fellow-creatures, but let us particularly endeavour, from the example of God, to gain him rather by kindness than by punishment. Let us imitate the beneficence of the Lord. We see how he refreshes the parched earth by the dew, and gives new life to the vegetable world. Let us then consider how many of our fellow-creatures are in distress, and languishing for want of assistance. Let them not implore our aid in vain. But let us endeavour to revive their hearts by kindness, and to pour as many blessings on our fellow-creatures as the dew sheds upon the tender plants.

## JUNE XVII.

### *Life and Labours of the Bee.*

In the fine days of the present season, in this time of cheerfulness and joy, every thing is in motion; every thing throughout the animal world is full of life and activity; but there are no creatures so active as the little republic of bees. At

least it is certain, that of all the insects around us, there are none we can better learn to be acquainted with, or which can afford a more pleasing and profitable scene.

Bees generally dwell, in great numbers, in hollow trees or cavities, or in a sort of basket called a *hive*, which men have formed to collect them together. In their excursions from home, they disperse themselves over the country, and, by means of their trunk, or proboscis, collect honey and wax from the juices and stamina of flowers. These they bring to their dwelling, which they fill from top to bottom with hexagonal cells, for the different purposes of accommodating themselves, receiving their eggs, lodging their young, and stowing the honey which is to support them during the winter.

Among these bees, which form but one numerous family, there is one larger than the rest, which is a female, and therefore called their queen: to her alone all the young bees born in a hive owe their birth. From the eggs she deposits in the cells, worms are produced, which the working bees feed for some time with their trunks. Afterwards these worms remain about fifteen days in their cells, which are closed with a covering of wax, without any motion, and apparently dead. In this quiescent state they are called *nymphæ:* but when the proper time is arrived, they open their cells, and come out in the form of young bees. Besides the queen, there are in each hive two sorts of bees—the drone and the working bee: the drones are males; they im-

pregnate the queen, and serve as her guard. Bees have on their heads two horns or antennæ, which guard their eyes, and warn them of dangers: they have fangs or claws which they use in their work; and a trunk, or hollow tube, which they can draw in and out of its case at pleasure. This instrument, supple and moveable in every way, reaches to the very bottom of the cup of the flowers where they gather their honey, and passes through the case into the honey-bag placed within their bodies, whence the honey is afterwards poured into the cells of the storehouse. Bees have six feet: with the two first, and their fangs, they form the wax or farina of the flowers into little balls; and with their middle feet they put them into a hollow, shaped like a spoon, which they have in their hind feet; which are also furnished with hair, in order to retain the wax, and prevent it from falling when they fly. Thus laden, they return to their cell, without losing their way, though they are sometimes several miles from it. When they arrive, they find other bees waiting to assist them in unloading their booty; and then they all work in common, and employ their provisions for the general use of the hive. With the wax they close up the crevices of their dwellings, to prevent any other animals from intruding; and leave only such openings as are requisite for their own convenience. The queen and the working bees have, at the extremity of the body, a sting, enclosed in a case, which they make use of to wound or kill their enemies: but the wound they inflict is ge-

nerally fatal to themselves, when the sting remains behind.

Every thing in these little animals is calculated to excite our admiration: the formation of their limbs, so regular and so well adapted to their kind of life; the care they take of their young; the art with which their cells are built; their activity, their industry, and intelligence. Let us never pass a beehive with indifference. Let us admire its industrious inhabitants, and this admiration may lead us to more sublime thoughts. If we wish to reflect on our Creator, we shall find him here. This interesting scene will lead us to him; and we shall adore his wisdom, his power, and his goodness, in the production of these little creatures.

## JUNE XVIII.

### *The External Parts of Plants.*

In order to form a just idea of the inimitable art which appears in the vegetable kingdom, we must proceed by degrees. Our understandings are too limited to see the whole together, or to acquire a perfect knowledge of it. We must therefore content ourselves with some observations, and pass from visible to invisible things; from simple and individual objects to those which are more complicated and general. Let us begin, then, by considering the external parts of plants, and first survey their roots. These are so constructed,

that, by means of the principal root, with the fibres, and little roots which grow out of it, the plant is fastened to the ground. The pores of the root serve to receive the watery and nutritive juices which the earth contains. Out of the root grows the stem, to which the plant partly owes its strength and beauty. Its form is varied according to the nature of the plant. Sometimes the stem is formed like a pipe, strengthened by different knots curiously arranged: at other times the stalk is so weak, that it requires a support round which it may twine and fasten itself by means of little hooks. Sometimes, also, the stem rises majestically, like a strong pillar; becomes the ornament of the forest, and seems to brave the stormy wind.

The branches extend themselves like the arms of the human body, and are very regularly distributed. They spread and divide themselves into boughs, which are placed collaterally, and in the same order as the principal branches. The buds which proceed from the branches, are nothing but little plants, which, being put into the ground, take root, and become exactly similar to the tree on which they first grew.

The leaves, those lovely, pleasing ornaments of plants, are regularly disposed round the stalks and branches; and such is their variety in structure, figure, size, and beauty, that amongst thousands we can scarcely find two which exactly resemble each other. Leaves are either simple or compound, hairy or fleshy, smooth or curled and indented.

The blossoms of trees, which constitute one of nature's most fascinating charms, are not less diversified than the leaves. Some are plain, and have but one flower, others have several: here we see a vase opening gracefully; there we see the figures of helmets, bells, stars, suns, or butterflies with expanded wings. Some leaves or petals are placed carelessly round the plant; others form circles, bouquets, or garlands. From the centre of the flower rises a little pillar, and sometimes several, which are hollow within, and round or pointed at the top: these are called *pistils*, and they are generally surrounded by lesser pillars, called *stamina*, which support the *anthers* containing a very fine powder. But who can describe the delicate texture of many of the blossoms; the sweetness of their perfume; the liveliness, variety, and splendor of their colours?

To the blossoms succeed fruit and seeds, which afford an agreeable source of nourishment to men and animals, and also repair the waste of the seasons; as they enclose, under one or several coats, the germs of future plants.—The external form of fruits and seeds varies as much as that of the leaves or blossoms, and there is scarcely any form that is not distinguishable in one or other of them. All these parts of plants have their proper use and design: let the smallest part of them be taken away, and the plant will lose some of its perfection, beauty, growth, or increase. As extraordinary as it may appear, it is certainly true, that all those parts, without one single exception, are more or less necessary to the per-

fection of the whole. To illustrate this by experiment: take the leaves from a tree, and it will soon wither and perish. It is the same with all other plants: there is nothing superfluous amongst them; nothing that has not its use; nothing that does not evidently tend to the perfection of the whole.

But in discovering this connexion, this harmony, and wonderful arrangement of the vegetable kingdom; in seeing that the whole is beautiful, and regulated by general laws, though differently applied; shall we not conclude that the Author of all those beauties must necessarily be possessed of infinite wisdom? This consequence is as natural as that we draw, when, on hearing a person speak, we conclude that he must be near us. Let us therefore raise our souls to the Creator of all things! We shall every where find him. It is for this purpose that he has formed the plants so magnificently, and thus displays to us their beauty and utility. Let the Divine Wisdom be ever present to us! It will appear in the smallest blade of grass, if we take the trouble to examine it closely. Such reflections will make us more sensible of the pleasures of summer, and render it still more interesting in our eyes. The more we accustom ourselves to reflect on the wisdom of God, the more satisfaction we shall have in contemplating nature: at each flower we behold, we shall cry out with transport,—How great is our Creator! how admirable is his wisdom!

## JUNE XIX.

### *Hymn of Thanksgiving for the Works of the Creation.*

To thee, O Lord, from whom proceedeth every blessing, and who dispensest them so bountifully; to thee belong glory, honour, and thanksgiving. Thou hearest the cries of the young raven, and takest pleasure in the song of the lark: vouchsafe to listen also to my voice, and accept the just tribute of my humble praise.

The least of the creatures formed by thy hand proclaims thy wisdom. Traces of thy goodness and power are seen from one end of the year to the other, and are continually renewing. Each blade of grass declares the greatness of God, and our own nothingness.

With parental tenderness thou providest for our necessities, and givest to men and animals their proper food. From day to day thy blessings continually succeed each other; and even the wicked man feels the effect of thy goodness. O God! who is like unto thee? The earth is full of thy goodness and wisdom! Vouchsafe to teach me, O Lord! how to praise thee worthily. Incline my heart to love thee; and let me hereafter live only for him who is continually loading me with benefits.

It is in thy name, and in the hope of thy blessing, that the husbandman sows his corn. It is thou who makest the seed fruitful. This earth, which for our sins had a curse laid upon it, is blessed again by its Creator, and bringeth forth

an abundance of fruit. Thou waterest the furrows of the fields. Thou, clothest the meadows, the valleys, and the plains, with flowers, trees, and herbage. Thou orderest the cool and refreshing dew to moisten our gardens and fields, and to diffuse upon them fertility and abundance.

Dry and thirsty lands are watered by thy gentle showers; while damp and cold places are warmed by the rays of thy sun. By thy wisdom the times and the seasons are ordered in a manner the most beneficial to mankind; and, in the midst of all the vicissitudes of heat and cold, rain and drought, we still behold ample supplies of food spring up, grow, and ripen. Thou coverest our fields with luxuriant harvests, and the wings of the wind support the waving corn. Thou adornest the tops of barren rocks with grapes. Thou dressest our pastures with clover; and, at thy command, fountains and rivulets gush forth to refresh the thirsty animals.

Thou causest the tree to take root and prosper. Thou makest the quickening sap to circulate through its trunk, and givest it force to branch out into leaves and blossoms; while the abundance of fruit, under which the boughs bend, proves the pleasure thou hast in doing good.

O let us glorify our Creator, and Benefactor! Let us bless his holy name! Let us praise his mercies with transport! Great is the Lord our God! All his works are holy and wonderful! Let us exalt his almighty name! The Lord is good! It becometh the righteous to publish his praise for ever and ever.

## JUNE XX.

### *Caterpillars.*

THOUGH these insects are so disagreeable to the lovers of gardens, and so disgusting to many delicate people, they nevertheless deserve our attention. Caterpillars generally live on our trees; and we have such an aversion to them, that, wherever we meet with them, we endeavour to destroy them. This is the reason we do not deign to honour them with a look, and still less to examine them minutely; and yet there is no doubt but these insects may very agreeably amuse an attentive observer of nature. Let us here try to prove it. Perhaps, by raising the curiosity of those who have hitherto neglected them, they may be induced not to trample them under foot, without, at least, first observing their wonderful formation, and thence taking occasion to look up to the Creator.

The species of caterpillars already known amount to more than three hundred, and there are new ones daily discovering. Their shape, colour, form, propensities, and modes of life, all differ in some respects; but they have in common an annular structure, being composed of many rings, which, by dilating and contracting, draw the animal along wherever it goes. Nature has given them two sorts of feet, which have each their particular use. The six fore feet are a sort of hooks, which they use in taking a fast hold, and clinging to any thing. The soles of

the hinder feet are broad, and armed with little pointed nails. With the hooks they draw to them the leaves, the grass, and whatever they want for food, and they fix the fore part of their body with them while they are drawing up the hinder rings. The hind feet they use to keep themselves firm, and to grasp whatever serves them as a resting place. When they are on a branch, or a leaf, they can seize on food at some distance; for, by hooking themselves on with the hind feet, they stand up, and raise the fore part of their body, move it about, and poise it in the air on every side; get considerably upon the leaf, reach their food, and take it with their claws. However adapted the body of the caterpillar is to its several wants, it is remarkable that its state is but transient, that the limbs last but a certain time, and that this creeping worm becomes a chrysalis, without feet or motion, till it is metamorphosed into a creature classing with the inhabitants of the air. Were it for this reason only, the caterpillars would be worthy our attention.

Towards the end of summer, and often sooner, after having satiated themselves with verdure, and after having changed their coat several times, these animals cease to eat, and begin to build a house, in which they may leave the caterpillar state, and transform themselves into butterflies: this place of shelter, called the chrysalis, is of an oval form, marked toward the extremity with rings, which gradually diminish till they terminate in a point. The chrysalis is full of a sort of thick milk, which serves for food to the but-

terfly till it comes out. When it is entirely formed, and its parts arrived at consistency, and when a gentle warmth invites it to quit its prison, it makes itself a passage through the largest end, which is, at the same time, the thinnest part of the chrysalis. Its head, which was always turned toward this end, first disengages itself; then, the antennæ, or horns, lengthen, the feet and wings expand, and the insect rises into the air, retaining nothing of its former shape: for the caterpillar which was transformed into a chrysalis, and the chrysalis which became a butterfly, are very different creatures. The one is rough, hairy, and sometimes of a hideous aspect; the other is decorated with the most brilliant colours: the one is contented with gross nourishment, the other sips the nectareous sweets of the finest flowers, and roams at large over the landscape, which it serves to embellish. Some persons may still think they have a right to ask, To what *purpose*, after all, are these caterpillars? would it not be better to be entirely free from them? No, certainly. On the contrary, the world would be less perfect than it is, if there were no caterpillars in it. Take away these insects, and you deprive the birds of a considerable part of their subsistence. As the birds were to feed on caterpillars, it was just that the Creator should ordain for their food the leaves and plants to which they have an equal right with ourselves. It is true, that the voracity of these animals makes them sometimes troublesome to mankind; but this is an evil which the Creator permits with much wis-

dom: for the mischief the caterpillars sometimes occasion, may serve to humble us, and make us recollect the uncertainty of all earthly possessions. And even supposing we could not penetrate into God's reasons for forming such creatures, we should not therefore have a right to deny their utility. On the contrary, we should thence take occasion to acknowledge our own ignorance, and rely implicitly on the wisdom of our Creator.

## JUNE XXI.

### *The Beginning of Summer.*

This day summer commences. Many of us have often seen the changes occasioned by this day throughout all nature: but do we know why the sun remains so long above the horizon? why this is the longest day of the year? and why, in reckoning from this time to the end of autumn, we perceive the heat and length of the days diminish in equal proportion? All these changes are occasioned by the annual revolution of our globe round the sun. When that luminary enters into the tropic of Cancer, the earth is so situated, that all its northern side is turned towards the sun; because the Creator has inclined the axis of our globe towards the north, and it invariably preserves that direction. On this direction, and on the constant parallelism of the axis, depend, properly speaking, the vicissitudes of the seasons.

Let us here reflect a moment on the goodness and wisdom of God, in thus inclining the axis of the earth. If it had been in a perpendicular direction, our globe would have been a very melancholy habitation, both for plants and animals. Neither the increase nor decrease of the days, nor any difference of seasons, could possibly take place. How much then to be pitied would the inhabitants of the North be! The air they must respire would be always as keen as that of March, and, with the exception of a little moss and grass, the soil would yield no vegetable productions. In a word, the greater part of the two hemispheres would be a frightful desert, inhabited only by a few insects.

In our climate* nature has at this time almost ended her annual work. She has already lost some of her variety. Nothing can be more green than the vines, the orchards, and the forests; but the shades of colour are not so pleasing as formerly. The meadows begin to whiten, and their flowers are mowed down. The corn insensibly grows yellow, and the number of flowers diminishes. Lately, the variety and brilliancy of these, with the diversified notes of the birds, had all the charms of novelty, and afforded us the most pleasing sensations; but now, the nearer we approach to autumn, the more these enjoyments diminish. The nightingale is silent, and the great heat makes it inconvenient to walk.

May we not here discover an emblem of human life? Are not the pleasures we enjoy equally

* Germany.

transient? Even the most innocent of them, such as nature in the beauty of spring presents to us, are liable to change, and give place to other objects. What we at present observe in the summer of nature, we may observe in the summer of life. When we have attained our fortieth year, which is the beginning of a riper age, the world loses part of its charms, such as delighted us in our youth; and, when we approach the autumn of life, we often become a prey to cares, and are less calm, less serene, and less joyous, than we formerly were. We shall then observe, that strength of body insensibly diminishes by age; and, finally, the days will come in which we shall say, "I have no pleasure in them."

But with what lively joy may I lift up my soul to thee, O God! who directest the seasons, who art the Father of all beings, and the fountain of felicity. I again acknowledge thy wisdom and goodness in the regular succession of the seasons. Grant that I may never forget thee, in the enjoyment of the numerous pleasures wh ch summer sheds over all nature; thou who disposest all things, and whose glory each season proclaims. May I be so much the more inclined to pious gratitude and adoration, as this may possibly be the last summer I shall live to see! Alas! how many of my friends and acquaintance, who were last summer enjoying with me the beauty of this world, have been carried off by death, before the present summer had begun! Perhaps I shall soon be united to them. Possibly it is for the last time that I have contemplated, in this world, the charms of nature. May I, therefore, live this

summer, as if it were my last. May I glorify thee, O God! with as much ardour as if I were sure of never more having it in my power to acquit myself of this duty. May I act in such a manner as never to regret having so often seen the return of the seasons. Vouchsafe, O Lord! by thy grace, to confirm me in these resolutions; and, as thou hast inspired them, give me strength also to put them in execution.

## JUNE XXII.

### *The Nightingale.*

THE nightingale is a musician of the first rank amongst the inhabitants of the air. When all the birds, which, during day, entertained us with their notes, cease to be heard, the voice of the nightingale is raised to animate the woods and groves. When we listen to the thrilling music of her notes, we are apt to conclude that the bird must be large, that her throat must have uncommon strength; and the inimitable charms of her melodious accents make us presume that in beauty she surpasses all other volatiles. But in vain do we seek these perfections in the nightingale: she is a bird of mean appearance, whose colour, form, and whole exterior, have nothing majestic or attractive. Nature, however, has amply compensated for this plainness, by giving her a voice irresistibly charming. Listen to her long quivering notes. What variety, sweetness, and brilliancy! When she begins her song, she seems to study and compose before-hand the melodious

accents she wishes to pour forth. She begins softly; then the notes swell gradually, till they run with the rapidity of a torrent. She proceeds from serious to gay; from simple notes to the wildest warblings; from the lightest turns and shakes to languishing sighs; and has throughout the whole, the art of pleasing the ear.

This bird may give rise to many useful and edifying reflections. For example, we may learn from her this truth, that homeliness of body is sometimes united with very estimable qualities, and does not exclude beauty from the soul. How unjust then are those persons who, only attaching themselves to the features of the face, and to exterior qualities, neither praise nor blame any thing but what strikes their senses, and despise those who have bodily defects. Let us learn to judge with more equity. Any man, though deprived of the advantages of figure and fortune, who proves himself by his conduct to have the soul of a sage or a saint, is by much the more worthy of our esteem. The perfections of the soul alone give true merit to man, and render him worthy of admiration; the rest can only seduce those who do not know the value of wisdom and virtue. Have we not often known persons, neither distinguished by rank nor exterior qualities, who have rendered the greatest services to church and state? Crooked and deformed people have often shown more greatness of soul than those who possessed the most beautiful and majestic form. This is a lesson not to trust to appearances. Those we despise may often prove to be superior to ourselves.

When we hear the skilful harmony of the nightingale, should it not naturally lead us to the Creator, from whom she has received this talent? What wisdom must there be in the formation of this bird, to make it capable of uttering such sounds! Lungs so delicate as those of the nightingale, the motions of which are so violent, must be easily wounded, if they had not the singular advantage of being fastened to the back-bone by a number of strong fibres. The orifice of the windpipe is very large, and this certainly contributes to the variety of those sounds, which, in charming the ear, fill the soul with a sweet and pious delight. Is it possible not to trace a Divine Wisdom and Providence in this? and will not even the song of the nightingale lead us to glorify the Author of all nature? Lovely songstress! I will not leave thee till I have learned from thee the art of praising my Creator and thine. Pour, with thy song, gratitude and joy into the hearts of the many insensible mortals, who in these cheerful days contemplate with indifference the beauties of the creation.

## JUNE XXIII.

### *The Pleasures which Summer affords to our Senses.*

SUMMER has inexpressible charms, and gives us daily proofs of the infinite beneficence of our Creator. It is the happy season in which God pours out the treasures of his blessings in the greatest abundance on every living creature. Nature, after having revived us with the pleasures of spring, is

employed, all the summer, in providing for us every thing that may gratify our senses, render our subsistence easy, supply our wants, and awaken in our hearts just sentiments of gratitude.

By virtue of the secret laws of nature, an innumerable quantity of fruits grow before our eyes in the fields and gardens: fruits which, after having pleased the sight, may be gathered and preserved for our food. The flowers afford the most agreeable diversity to our senses; we admire their rich dress, and the inexhaustible fertility of nature in the multiplicity of their species. What variety and beauty also in the plants, from the humble moss to the stately oak! Let us climb the highest mountain, seek the cool shade of the woods, or descend into the valley, we shall every where find new beauties. A multitude of objects strike our eyes at once, all different from each other, but each possessing in itself sufficient charms to fix our attention. There we see innumerable flowers; here living creatures of different kinds. If we look upward, our eyes are delighted with the celestial azure; if we look downward, they are refreshed by the beautiful verdure with which the earth is clothed. Our ears are charmed with the cheerful notes of the winged songsters; the variety and simplicity of their melody fill the soul with the sweetest sensations. The murmuring of the brooks, and the silver waves of a fine flowing river, also please the ear and eye. To indulge our taste, the strawberries and other delicious fruits ripen; which, independently of the pleasure they afford, tend to cool the blood. Our barns and granaries are filled with the new pro-

ductions of the fields and gardens, which afford us the most wholesome and agreeable food. Our smell is regaled with the sweet perfumes that ascend on every side. In a word, a thousand pleasing objects affect the senses, and raise our sensibility. Numerous flocks feed on the profusion of bountiful nature, to procure us pleasant and wholesome milk, and nourishing meats. Abundant rains moisten the ground, and open to us new sources of blessings. Tufted trees and groves afford us a delightful shade. All that we see and hear, all that taste or smell can convey, increases our pleasures, and contributes to our happiness.

But the creation is a scene still greater and more enchanting for the mind than for the senses. Where the senses cannot reach, the mind discovers beauty, harmony, variety, and new pleasures. In all creatures we discover traces of their *Adorable Author*. If we raise our eyes to heaven, the sun, the moon, and every star, combine to declare *his* creative power. If we smell the charming odour of the flowers, that sensation reminds us, that *he* has formed them so as to exhale those rich perfumes. If we taste a delicious fruit, we see *his* goodness manifested in the means of nourishment. All that we perceive through the medium of our senses leads us to God, and consequently ennobles all our sensations. While admiring the beautes of nature we rise imperceptibly towards the Centre of Perfection. While our attention seems engrossed by earthly objects, we insensibly soar toward heaven, and are lost in the immensity of eternity.

O celestial joy! is there any pleasure for which I would exchange thee, or that equals thee in value? O how I wish to devote myself to these reflections, that the gratification of my senses may furnish me with an intellectual feast! But though I were permitted to behold a thousand revolving summers, I should still discover *new* objects of admiration; and this affords a convincing proof of the reality of that future existence for which I hope. There my senses shall be more exquisite, and my comprehension more perfect than here below. Sublime beauties shall then present themselves to my view, and my joy shall be more ecstatic than I can now conceive.

## JUNE XXIV.

### *A Sketch of the Inward Parts of the Human Body.*

THE more difficult it is to acquire a competent knowledge of the internal parts of the human body, the more necessary it is to profit by the information with which we are furnished by skilful anatomists.—With the view of facilitating the knowledge of those parts, I shall now give a short description of them.

The construction of the *heart*, which is placed near the middle of the breast, and is the moving principle of the whole machine, is worthy of admiration. This consists of musculous fibres curiously interwoven. Two cavities, separated from each other by a partition, and which are called ventricles, are formed in the inside of this organ.

The *lungs* are of a spongy substance, which, like bellows, extend and contract, in order to draw in and expel the air. They swell out on both sides, and fill almost the whole space of the breast, to refresh it with the air drawn in, and at the same time to prevent the blood from too much attenuation. The breast is lined with a fine membrane, called the *pleura*. Under the lungs is placed the *stomach*, which receives and digests the food, and is shaped like a purse. On the right side is the *liver*, which covers one side of the stomach, and, by its warmth, assists digestion. It separates the bile from the blood, which collects in a particular vesicle called the *gall bladder*, and thence descends into the bowels, which it stimulates to action. Opposite to the liver is the *spleen*, which is a soft bag, and easily stretched. The blood is conveyed into it by arteries, and flows out of it through the veins. Behind the liver and spleen are the *kidneys*. Of these there are two—one to the right, the other to the left. The use of them is to separate from the mass of blood the humours which overflow into the bladder. Under these parts are placed the *intestines*, joined to the mesentery. They complete the separation of the digested food, and serve to expel the grosser parts from the body. The *mesentery* is a great membrane with a variety of foldings, to which the intestines are attached. Upon this there are innumerable vessels, as fine as hairs, which are termed the *lacteals*, because they contain a juice, extracted from the food, similar to milk. In the middle of the mesentery

is a large gland, where the lacteal veins meet as in a centre. A skin, full of folds, glands, and muscles, covers all the intestines. That part of the body called the abdomen, which begins at the stomach, is separated from the breast by the *midriff*. It has several openings to let the vessels pass which are to descend to the lower parts. The liver and spleen are fastened to it; and the shaking of it not only occasions laughter, but serves also to disengage the spleen from the humours which incommode it.

These are the principal parts of the breast and belly; independent of which, there are several others which communicate with them. At the beginning of the neck are the *œsophagus* or gullet, and the *windpipe*. The œsophagus is the channel through which the food passes to the stomach. Through the windpipe the air penetrates to the lungs. Whilst the lungs are sending back the air through this channel, the voice forms itself; at the same time the breast throws off the superfluous humours. At the entrance of the windpipe there is a little valve, which opens to give passage to whatever is to go out through this tube. The lower orifice of the stomach is provided with a similar valve, which opens when the food presses upon it, and then closes upon it, to prevent its rising up again. In the upper part of the head is placed the *brain*, which is capable of receiving impressions from external objects. Its whole mass is covered with two thin transparent membranes; one of which, called *pia mater*, is the first envelope: the second, called *dura mater*, is interwoven with arteries and veins.

Independent of these parts, each of which has its settled place, there are others dispersed throughout the whole body, such as the bones, arteries, veins, lymphatic vessels, and nerves. The *bones* united together by joints, partly serve to support and give the power of motion to the body, and partly to preserve and guard its nobler parts. The *arteries* and *veins* are diffused throughout the body, in order to nourish it with the blood which circulates in them. And there are also several *lymphatic vessels*, which generally join to certain glands, and receive a transparent yellow liquor, which they afterwards distribute throughout the body. The *nerves*, of which ten principal pair are reckoned, are little fibres springing from the brain, and thence diffusing over the whole body, to the very extremities of it. They contain a kind of medullary substance like that of the brain, and are the organs of sense and motion to the whole machine. All these parts are perforated with holes, that the light and subtile matter, and whatever is superfluous in the body, may evaporate. These holes, which, by their extreme minuteness, are invisible to the naked eye, are called *pores*.

The same wisdom so conspicuous in the solid parts of the body, is equally so in the fluid. The blood, chyle, lymph, marrow, bile, nervous juice, and the different sorts of viscous and gelatinous humours, supplied by innumerable glands; their several properties, designs, and effects; the manner in which they are prepared, filtered, and separated from each other; their circulation and

reparation; all these prove the most astonishing art, and the most profound wisdom.

Let us now recapitulate what has been said on the interior construction of the human body. The *bones*, by their joints and solidity, form the foundation of this fine machine: the *ligaments* are strings which unite the parts together: the *muscles* are fleshy substances, which act as elastic springs: the *nerves*, which are dispersed over the whole body, connect all the parts together: the *arteries* and *veins*, like rivulets, convey life and health throughout: the *heart*, placed in the centre, is the focus, where the blood collects, or the acting power, by means of which it circulates and is preserved: the *lungs*, by means of another power, draw in the external air, and expel hurtful vapours: the *stomach* and *intestines* are the magazines where every thing that is required for the daily supply is prepared: the *brain*, that seat of the soul, is formed in a manner suitable to the dignity of its inhabitant: the *senses*, which are the soul's ministers, warn it of all that is necessary either for its pleasure or use.

Adorable Creator! with what wonderful art hast thou formed us! Though the heavens did not exist to proclaim thy glory; though there were no created being upon earth but myself, my own body might suffice to convince me that thou art a God of unlimited power and infinite goodness. May I henceforth pay more, and more becoming attention to this interesting subject; and may it invariably lead me to praise and adore the Divine Author of my existence!

## JUNE XXV.

### *Electric Fluid.*

FROM the many experiments made in our time, no person now disputes the existence of the electric fluid, the singular effects of which have fixed the attention of all Europe for more than half a century. It appears that this fluid is equally diffused through all bodies; but, like the air, it is imperceptible to our senses till it is agitated. It is also necessary, that, when the balance is interrupted by any cause whatever, it should be restored, before we can sensibly perceive the electric fluid. Here it is necessary to distinguish two kinds of electric bodies: those in which the electric fluid may be excited by means of friction, and those which receive their electric power by communication with the former. Those of the first class are chiefly glass, pitch, rosin, sealing wax, silk, hair, &c. All other bodies, but particularly water and metals, belong to the second. Bodies of the first kind are capable of preserving the electric matter collected in them: those of the second, on the contrary, lose it as soon as they receive it.

Machines have been invented, in which, by means of a large wheel, a rapid motion is given to a glass globe, or cylinder, which, in turning round, rubs against the hand, or a cushion. By this friction, the globe preserves its electric force, which may be extended at pleasure by means of iron

bars or chains, which communicate with the glass globe. If while the machine is working we put our hand on one of these bars, we receive a shock; and if the room be darkened, a luminous spark will be perceived. If several persons form a circle, holding each other by the hand, they will at the same moment receive the electric stroke, which may be made more or less violent.

The electric fluid may be accumulated to such a degree, as to kill, by its discharge, not only sparrows and other little birds, but also hens, geese, ducks, and even sheep. This experiment is performed by means of large glass bottles filled with water, and fastened together with metal chains, which fasten them also to the glass globe put in a state of friction, as before described. The water conveys a great quantity of electrical matter into the inside of the bottles, and, at the same time their outside surface loses an equal quantity. A vivid flash, a great explosion, a violent commotion, the combustible matter taking fire, and the death of the animals, are the consequences of this experiment. There are others, also, which are common to all these sorts of experiments, such as a sulphureous smell, an agitation of the air, and the electric matter acquiring a new property. It has been observed, that some experiments failed, because the iron bars which were to serve as electric conductors, were too angular and pointed; and, it was suspected that the electricity lost its force by the points. This conjecture was confirmed when, on putting the hand near the angles and points, a copious stream

of the electric fluid was perceived to issue from them. It was then supposed that those points which ejected electrical matter, might also serve to attract it, and many experiments have proved the truth of this conclusion.

If any one should think these observations of no importance, let him consider that we may learn more and more the use of this extraordinary phenomenon of nature, from which a twofold use has already been drawn. Physicians have joined electricity to their art; and there are examples of its having cured paralytic limbs. And naturalists have discovered a great analogy between lightning and electric fire, which has given rise to new opinions concerning the formation of thunder, and has changed the former ideas on that subject. Thus, from time to time we receive new solutions of the mysteries contained in the great works of our Creator. How limited are the views of man! and how little attention does he pay to those important things which are placed before his eyes, since the phenomena just mentioned were for many centuries unknown; and, even now, how little are we acquainted with nature! and how much have we yet to learn!

## JUNE XXVI.

### *The Manner in which Thunder is formed.*

FORMERLY, and even at the beginning of the eighteenth century, it was supposed that thunder

proceeded from an inflammation of salts, sulphureous matter, and other substances, which are found in the air. It was imagined that there was the greatest resemblance between the effect of fire-arms and that of thunder and lightning. But all the explanations by which men endeavoured to establish this system, were not sufficient to remove the difficulties which opposed it, or to account for the supposed effects. But since the phenomena produced by electric fire have been observed with due attention, we are authorised to assign a very different cause for thunder. The perfect resemblance between that and electricity, has convinced naturalists that they are precisely the same, and that electricity is in our hands what thunder is in the hands of nature: the latter executes at large, what we imitate in miniature. It will not be difficult to demonstrate this, even to persons who are unacquainted with natural philosophy, if they will only take the trouble to compare the effects of thunder with those of electric fire.

The effects of thunder are discovered by a loud noise heard at a distance, and by conflagration. Buildings exposed to it are often consumed by flames. Men struck by it become black, and appear scorched, though sometimes there is no trace of fire, the violence of the stroke having killed them; their clothes are torn to rags, they are thrown to some distance from the place in which they were, and the part of the body which was struck is pierced with holes. Sometimes large stones are broken by the lightning, and its

ravages are discoverable on the ground where it falls. Electricity produces the same effects, but in a less degree. When by means of water, its force is increased, the electric flash is followed by a strong commotion; very compact bodies are pierced with holes; birds and other small animals are killed by it; and every flash is accompanied with a loud noise. The stream of fire also that passes from the points of electrified bodies with a hissing noise, is one of the phenomena observable in lightning; and with respect to velocity, there is still greater resemblance between thunder and electricity. If during a storm, a sword or chain be hung up in the air by silken strings, it becomes electrified; and on the approach of the finger there will come out of it sparks of fire, more or less, in proportion to the degree of storm, or our distance from it: in a word, all the effects of electricity appear during a thunder-storm. After such experiments, it can no longer be doubted, that the air is highly electrified when there is a storm, and that thunder and lightning are merely the effects of a violent electrical fire.

Thus all that appeared wonderful and tremendous in these phenomena, disappear by degrees, as we become better acquainted with the laws of nature. Consequently every one should have a general knowledge, at least, of the first principles of natural history. Terror and superstition, which often mix with our observation of nature, would soon be at an end, if we either resolved to reflect upon it ourselves with more attention, or to

consult others who are well informed upon the subject. Let us make use of the light we have acquired to banish the dread and horror which so strongly seize our minds at the approach of a storm; and let us always look up to and trust in that God who alone performs such great marvels;—for however capable we may be of assigning the causes of thunder, according to invariable principles drawn from natural philosophy, the phenomena are not less remarkable; on the contrary, they present certain circumstances which are totally inexplicable even to the most enlightened mind. It is enough for us to know, that the nature of the air, and of the atmosphere which surrounds us, renders this phenomenon necessary; that storms, in the hands of God, are means of rendering the earth fruitful, and, therefore, they should excite us to pay a tribute of adoration and gratitude to our Creator!

## JUNE XXVII.

### *Herrings.*

About this period the herring-fishery commences on the coasts of England and Scotland; by which means the inhabitants are supplied with food during a considerable part of the year.

Let us examine what is most important in the natural history of these fish. Innumerable shoals of herrings live in the Frozen Sea, near the arctic pole; but at a certain period they quit that

place, and come in multitudes to the coasts of England and Scotland. We cannot positively ascertain the cause of this emigration: some think it is to avoid whales and other great fish inhabiting the frozen seas; others imagine that the prodigious increase of the herrings occasions them to take these long voyages, and that finding themselves too numerous under the northern ice, they are obliged to separate into colonies, that those which remain may find sufficient subsistence. Perhaps, also, it is the desire of propagation, and a peculiar instinct, which leads them to the places most favourable for the increase and preservation of their race.

Whatever be the cause, however, which influences their motions, it is certain that immense shoals of herrings quit the north at the beginning of the year: for, in the month of March, the western wing of their army reaches the coasts of Iceland, and they are then so extremely plentiful, that mariners take up great quantities of them at once, with the scoops with which they water the sails. The eastern wing advances farther, into the Baltic Sea: a part of it turns towards the North Cape, sails along the coasts of Norway, and enters through the Sound into the sea: another part gains the northern point of Jutland, then enters into the Zuyder Zee, and thence passes again through the Baltic, in order to return to the place whence it set out. But the largest detachment of the eastern wing, is that which turns to the western coast, and steers directly to the Orkneys, where the Dutch go to

catch them. Towards the 8th of June, the seas in those parts are full of herrings. They then direct their course towards Scotland and England, where they fill all the bays and the mouths of the rivers with their fry. After having quitted England, they probably return to their own seas.

The prodigious multitude of these fish is truly surprising; a single herring lays at least ten thousand eggs in the sea near the British coasts. This great fecundity renders credible what is said of the Dutch fishery, where there are annually caught above two hundred millions of herrings—a fishery which supports numbers of people, and adds about twenty millions of crowns to the Dutch revenue.

It is but just that we should lift up our hearts to the almighty and beneficent Creator, who, by a guidance full of wisdom, causes these fish to fall into the hands of man. But by how many different ways does he provide for our support! All the seas, lakes, and rivers, are subservient to mankind, and contribute to our preservation.

How populous is the ocean! how many aquatic armies glide through its yielding bosom! There the king of its inhabitants sports himself; and there, amidst innumerable perils, the mariner pursues his trackless course. Directed and preserved by thee, O God of Providence, all that exist on the earth, in the air, and in the mighty waters, look up to thy hand, and are satisfied with thy goodness. And we also, beneficent Father, are fed by the numerous tribes with which thou hast peopled the ocean. For our

sakes the herrings perform long and surprising voyages; and by them thou suppliest the rich and poor with a cheap and wholesome article of food. May we receive this gift with becoming gratitude, and bless that God who has formed such creatures for our profit and convenience!

## JUNE XXVIII.

### *Eclipses of the Sun and Moon.*

It is shameful, that, in an age so enlightened as ours, not only the multitude, but even those who pretend to be superior to the common people, should be still ignorant of the phenomena of an eclipse. Want of knowledge on this subject excites a superstitious dread in the minds of the ignorant, during an eclipse of the sun or moon; and the absurd practices of shutting up wells, &c. at such times, to prevent the water from acquiring a noxious quality, afford melancholy proofs of the ignorance and impiety of mankind. Let us, therefore, attempt to acquaint ourselves with this subject; not only as it is very remarkable in itself, but also as it presents us with a new occasion to glorify our Creator. An eclipse of the sun is an effect purely natural: it is caused by the shadow which the moon projects upon the earth; but this can only take place when the moon, which is an opaque body, and dark in itself, comes nearly in a direct line between the sun and our earth: it then conceals from us a

part or the whole of the sun. The former is called a *partial*, the latter a *total* eclipse. Thus the solar eclipse is nothing more than the situation of the earth when the moon's shadow falls upon it; and therefore, strictly speaking, it is only an eclipse of that part of the earth where the moon's shadow falls. Hence we learn that the sun is not really darkened; it is only concealed, for the time, from us. This luminary retains its usual splendor; and all the difference is, that the rays which issue from it cannot reach us, because the moon is placed between the sun and our globe. This is the reason that a solar eclipse is never visible at the same time in all parts of our earth; for, unless the sun had really lost its light, the eclipse could not be visible at the same time in every part of the hemisphere: on the contrary, it is always greater in one country than in another, and in some places it is not visible at all.

The moon not only darkens our earth sometimes, but the latter also casts its shade upon the moon, and by that means either totally or partially intercepts the rays of the sun; and this is called an eclipse of the moon. But this can only happen when the moon is at one side of the earth, and the sun at the opposite side, and consequently, when it is a full moon. Now as this planet is really darkened by the shadow of the earth, the eclipse is perceived at the same time on all the points of one hemisphere of our globe.

Should any one inquire the *utility* of the solar and lunar eclipses, it may be replied, that to

those who do not estimate natural things merely by the sensible benefits which result from them, they are of great importance. It is by their means that the true position and distance of towns and countries are known; and that we have been able to trace accurately the geographical maps of the most remote countries. Eclipses, if well observed, serve also to confirm chronology, and to direct the navigator, by showing him how far he is from the east or west.

However inattentive we may be to the importance of these advantages, they are of the greatest utility, and contribute in some degree to the happiness of mankind.

## JUNE XXIX.

### *The Stalk of Wheat.*

We see that the wheat is growing every day, and that the tender ears of corn are insensibly ripening, in order to furnish us, some weeks hence, with wholesome bread—that precious blessing with which nature rewards the labours of man! Let us cast our eyes over a single field of wheat, and endeavour to count the millions of ears which gently wave in the air; and then let us reflect on the wisdom of those laws which procure such an abundance for us. How many preparations are necessary to furnish us with this most indispensable of all food! How many progressive changes must take place in nature before

an ear of corn can spring up! It is now almost ready to produce its fruit, and invites us to reflect on its construction.

When the grain of wheat has been some time in the ground, it shoots up a stalk, which rises perpendicularly, but only grows slowly, that the grain may have time to ripen. It is for very wise reasons that it grows four or five feet high, in order to preserve the grain from the moisture of the ground, which would otherwise rot it. The height of the stalk contributes also to refine the nourishing juices which the root conveys to it; and its round form assists this operation; for, by that means, the heat penetrates equally into every part of the stem.

But how is it possible that so slender a stalk can support itself, and bear up its fruitful head without sinking under the weight, or without being beat down by the least blast of wind? The Creator guarded against this inconvenience in the formation of the stem: he furnished it with four very strong knots, which, in some measure, serve as screws to keep it firm, without taking from it the power of bending. The construction of these knots manifests the greatest wisdom. Like a very fine sieve, they are full of small holes, and through these the juices rise and the heat of the sun penetrates. These pores attenuate the juices which are collected in them, and purify them by causing them to pass through these fine strainers. The stalk is liable to be beat down by storms and heavy showers of rain, but its slenderness is its security, as it is flexible

enough to bend without breaking. If it were harder and stiffer, it might certainly resist all weather; but would it then serve as a bed for the poor?

From the chief stem shoot out others not so high, whose leaves, collecting the drops of dew and rain, furnish the plant with the nutritive juices it requires. In the mean time, the ear, that essential part of the plant, forms itself by degrees. To preserve these tender sprouts from the accidents and dangers which might destroy them at the instant of their birth, the two upper leaves of the stalk unite closely at the top, both to preserve the ear of corn, and to draw to it the nourishing juices. But as soon as the stem is sufficiently formed to supply the grain of itself with proper juices, the leaves gradually dry and drop off, that nothing may be taken from the grain, and that the root may have nothing to nourish which is useless. When this scaffolding is removed, the edifice appears in full beauty. The bearded corn waves gracefully, and its points not only serve for ornament, but also as a defence against the birds. Refreshed with gentle rains, it thrives till the appointed time, and grows every day more yellow, till at last sinking under the weight of its riches, it voluntarily bends its head to the sickle.

What wonderful wisdom and power appear in the construction of a single stalk of wheat. Yet we seldom pay attention to it because it is daily before our eyes. But what other proof of goodness can the Creator give us, if we be insen-

sible to this? Ungrateful, thoughtless, man! open thy heart to the sweet sensations of joy and gratitude! As long as thou art capable of contemplating a field of wheat with indifference, thou wilt be unworthy of the food it furnishes in such abundance. Learn then to think as a man, to enjoy the noblest pleasure a mortal is capable of in this world—that of tracing thy Creator in every thing he has formed. Then only shalt thou rise above the brute creation, and approach the felicity of the glorified children of God.

## JUNE XXX.

### *The Blight.*

An innumerable quantity of insects covering the stalks and leaves of plants forms what is commonly termed a *blight*. These insects are nearly as numerous in their species as the varieties of plants they infest; and the singularities which they exhibit render them peculiarly worthy of our attention. What distinguishes them from any known species of animals, is, that they not only lay eggs, but also produce young ones alive. In the heat of summer they are viviparous, that is, the young ones come from the mother's womb completely formed and alive; undoubtedly, because the plants at that time furnish them with nourishment. Towards the middle of autumn they lay eggs, which are not hatched till the ensuing spring; because, if the young ones were produced sooner, they would perish for want of food.

Precisely at the period when the females begin to lay, the males appear; which seems to indicate that their existence was not necessary before. This supposition is fully confirmed by many experiments. If one be taken at the moment of its birth, and shut up in a glass by itself, it will, thus sequestered, bring forth another like itself, when it acquires a certain degree of growth; and it will, at the end of a few days, be surrounded by a numerous family. If the experiment be repeated on one of its young, and even for many generations, the result will still be the same.

Let us observe another singularity. In some species of insects the males have wings, and the females have none; but in these both sexes are alike; either both produced with them, or both otherwise. Those with wings are so small in comparison with the others, that they walk over them as they do upon fruit. This remarkable instance of what may be called singularities in nature, an instance so contrary to common rules, leads us naturally to inquire, whence these peculiarities proceed, and what could induce the Creator to deviate sometimes from the common laws? To answer this question in a satisfactory manner, we ought to be able to take in the whole of all that is created; to comprehend at the same time all the parts of the immense kingdom of nature, and the connexion between each, before we can be capable of judging to what, or how far, any thing can be useful or hurtful to the whole. But so deep a knowledge of nature being denied to our weak faculties, let us content ourselves with gene-

ral arguments. In the first place, God shows us, by these singularities, the command he has over all nature: he is the Supreme Lawgiver, who assigns to every being the law he is inviolably to observe. He, to whom every being is subject, has a right to prescribe such and such rules; and he has also the power to suspend laws, and to make whatever exceptions he pleases. Secondly, we find a great variety in nature; which affords us opportunities, not only to rejoice in the contemplation of it, but to admire the glory of the Creator. It is easy to conceive how much the exceptions to the general rules increase this variety, and, consequently, the pleasure of the observer, as well as the admiration of the Author of nature. Thirdly, experience teaches us, that the objects we have daily before our eyes become familiar to us; and their reiterated impressions leave us cold and insensible. The glorious scene of nature itself does not always interest us; because we have taken the habit of lightly passing over things which we see continually. Therefore, every singularity, every extraordinary phenomenon, is a fresh inducement to contemplate the works of God, and serves to rouse us from our indolence. Fourthly, and lastly, the singularities of the natural world, which, far from hurting the perfection of the whole, enter into the plan of Divine Wisdom, teach us, that the singularities of the moral world, and the fate of mankind, are equally under the direction of an all-wise Being, who will so order all things, that his holy name may be glorified for ever.

*Hymn to the Author of Nature.*

How great art thou, O Lord God of hosts! The heaven of heavens is thy throne, and the earth proclaims thy divine majesty. By thy word they were created, and thou hast fixed them in the immensity of space.

Thy praise resounds in the pealing thunder, and thou walkest, in formidable array, on the wings of the lightning. We perceive thee in the splendor of the sun, and recognise thy skill in the flowers which enamel our fields.

Who is it that rides on the whirlwind, that grasps the thunder in his right hand, and commands the lightning to blaze through the forests? It is thou, O Jehovah! Thousands of worlds glorify thy power, and at thy threatening they flee away, assume a new form, or are completely annihilated!

The whole creation is a temple erected to thy praise, and millions of celestial and terrestrial choristers adore thee, from the seraph who bows before thy throne, to the insect sporting in the solar beams. Creatures which now exist, and those which are in embryo, are all under thy government, and submit to thy divine authority.

What is *man*, that creature of earth, that thou shouldest set thy heart upon him? O God, in whom I put my sole trust, I bless and praise thee for all the mercies I have received from thy bounteous hand.

Thou hast placed me in a distinguished situation: the inhabitants of the sea, of the earth, and

of the air, are put under me: all the creatures here below acknowledge me for their sovereign.

O God! how magnificent is thy name! thy praise resounds to the limits of the creation; thy works proclaim thy glory from eternity to eternity.

## JULY 1.

### *Foreign Plants.*

ALL our different kinds of corn, and a great number of our vegetables, derive their origin from foreign countries, and generally from warmer climates than ours. Most of them come from Italy; Italy had them from Greece, and Greece from the East. When America was discovered, a multitude of plants and flowers, previously unknown, were found and transported into Europe, where they have been cultivated with much success; and the English still take great pains to cultivate in their own country many North American plants.

Most of the different sorts of corn, of which men and animals make their best food, are grass plants; but, though our fields are now covered with them, they are nevertheless exotics. Rye and wheat are indigenous in Little Tartary and Siberia, where they still grow without culture. As for barley and oats, we are ignorant whence they originally came, but it is certain they are not natives of our climate, or it would not be

necessary to cultivate them. Rice is the produce of Ethiopia, whence it was carried into the East, and afterwards into Italy. Since the commencement of the eighteenth century it has been cultivated in America; and they now annually send vessels into Europe laden with this useful grain. Buck-wheat came originally from Asia: the crusaders made it known in Italy, whence it was transported into Germany.

Most of our vegetables have a similar origin. Borage comes from Syria, cresses from Crete, cauliflower from Cyprus, and asparagus from Asia. We are indebted to Italy for the chervil, to Portugal and Spain for dill, to the Canary Islands for fennel, and to Egypt for anniseed and parsley. Garlic is the produce of the East; shallots come from Siberia, and horse-radish from China. We are indebted for our kidney-beans to the East Indies, for gourds to Astracan, for lentils to France, and for potatoes to Brazil. The Spaniards found tobacco at Tobacco, a province of Jucatan, in America.

The ornaments of our gardens, the most beautiful flowers, are also foreign productions. Jessamine comes from the East Indies, the elder-tree from Persia, the tulip from Cappadocia, the daffodil from Italy, the lily from Syria, the tuberose from Java and Ceylon, the carnation and pink from Italy, and the aster from China.

Let us gratefully acknowledge these various presents from heaven. With what goodness has God provided for our happiness and enjoyment, by making even the most remote countries con-

tribute towards them! But let us at the same time, learn the constitution of the globe which we inhabit. There is an universal transmigration upon the earth: men, animals, and vegetables, are transplanted from one region to another; and this transmigration will only terminate with our globe. May we, therefore, wherever our lot may be cast, endeavour to act uprightly and sincerely; that, during life, our names may be revered by the just and good, and that on our removal to a fairer and a better world, our memory may be blessed, and our loss lamented by those who have received the benefits of our philanthropic exertions!

## JULY II.

### *Transformation of Caterpillars.*

THE transformation of a caterpillar into a butterfly, is certainly one of the most wonderful phenomena in nature, and highly merits our attention. The manner in which caterpillars prepare for their change is very extraordinary: they do not all at once become butterflies, but pass to it through a middle state. After shedding its coat three or four times, the caterpillar strips itself of its last skin, and becomes a substance not in the least resembling a living creature. It is then enveloped in a hard shelly covering called the *chrysalis* or *nympha;* in which state it remains two or three weeks, sometimes six months, till at

last it comes out of this kind of sepulchre under the form of a butterfly.

There are, properly speaking, two sorts of butterflies: the wings of the one are raised, and those of the other are flat: the former fly by day, the latter during the night. The caterpillar of the nocturnal butterfly spins itself a bag, and shuts itself up, when the time of its transformation approaches. Those which are to be diurnal butterflies hang themselves up in the open air, on a tree, a plant, a wall, or some such thing. For this purpose, they make themselves a small web, with very fine thread, and then, turning themselves upside down, they suspend themselves so that their heads are somewhat inclined towards the top. Some of these, and particularly the hairy caterpillars, remain in this state, hanging perpendicularly with their heads downward. Others spin themselves a thread, which goes round the middle of their bodies, and is fastened at the two sides. In one or other of these two ways they prepare themselves for their great change. Thus, both sorts of caterpillars bury themselves in a manner alive, and seem to wait patiently the end of their caterpillar state, as if they foresaw, that, after a short repose, they were to receive a new existence, and should appear again under a brilliant form.

The death and resurrection of the righteous may be aptly compared to the transformation of the caterpillar into a butterfly. To a true Christian, death is but a sleep, a sweet repose, after the pains and miseries of this world; a mere mo-

ment, during which he is only deprived of life and motion in order to appear again in glory, and to enter into a new and better existence.

What is a caterpillar? a blind creeping despicable worm, and which, while it drags on its life, is exposed to numberless accidents and persecutions. Is the lot of man in this world much better?

The caterpillar prepares, with great care, for its transformation, and that state of weakness and insensibility into which it is to fall for a short time. It is exactly the same with a good man: he prepares before his death for this important change, and waits with joy and tranquillity for the happy moment in which he is to enter into a better state.

The caterpillar does not sleep for ever: its repose is only the forerunner of a more perfect state. At first it crawls upon the ground, but afterwards it springs up, and soars into the air by means of its wings. At first it was blind; but afterwards it receives sight, and enjoys a thousand agreeable sensations unknown to it before. Formerly it fed stupidly on gross food; now it goes from flower to flower, living on honey and dew, and continually varying its enjoyments.

In all this we behold a lively emblem of the death and resurrection of a righteous man. His weak earthly body appears again in a glorious state of perfection after his resurrection. As a mortal, he was attached to the world; subject to passions, and taken up with sensual and earthly objects; but, after his resurrection, his body is disen-

gaged from this earth: he hovers over millions of worlds, and, with a clear and distinct view, he takes in all nature at once. His mind soars infinitely higher still; it approaches even to the Deity, and gives way to the most sublime meditations. Before his death he was blind in the pursuit of truth; now he sees, and can behold it in its full lustre. His body being spiritual and incorruptible, he no longer requires gross food to satisfy his hunger. Very different sensations now form his happiness, and his heart overflows with purer joys. If such be the happy change we may expect, let us early prepare for it. If our present state be but transitory and imperfect, let us not make it our chief object, and let not the moments we pass here appear to us with the consequence of eternity.

## JULY III.

### *The Silkworm.*

THE race of caterpillars, which divide into two general classes (those of nocturnal and diurnal butterflies), have also different families among them, each of which has its distinct characteristics and properties. To one of these families the appellation of *silkworm* is given. This caterpillar, like the others, is composed of several movable rings, and is well furnished with feet and claws to rest and fix itself where it pleases. It has two rows of teeth, which do not move up

and down like ours, but from right to left, in order to press, cut, and tear the leaves every way. Along the whole length of its back we perceive, through its skin, a vessel which performs the functions of a heart. This worm has nine orifices on each side, which correspond with so many lungs, and assist the circulation of the chyle, or nutritive juice. Under the mouth it has a kind of reel, with two holes, through which it puts out two drops of the gum with which its bag is filled. These act like two distaffs, continually supplying materials for making its silk. The gum which distils through the two holes takes that form, and lengthens into a double thread; which suddenly loses its fluidity, and acquires the consistence necessary to support or to envelope the worm. When it is time to be enclosed in it, it joins the two threads together, gluing them one over another with its fore-feet. This double thread is not only very fine, but also very strong, and of an astonishing length. Each bag has a thread which is nearly five hundred ells long; and as this thread is double, and joined together throughout its length, each bag will be found to contain a thousand ells of silk, though the whole weight does not exceed two grains and a half.

The life of this insect, in its caterpillar form, is very short; but it passes through different states, which insensibly bring it to perfection. When it first emerges from the egg, it is extremely small, perfectly black, and its head of a still brighter black than the rest of its body: in a few days it begins to grow whitish, or of a dark grey

colour. Its coat then becomes ragged and dirty. It throws it off, and appears in a new dress. It becomes large, and much whiter, but rather tinged with green, as it feeds on green leaves. After a few days, more or less, according to the degree of heat, and quality of its food and constitution, it ceases to eat. It then agitates and frets itself extremely, becoming red with the efforts it makes: its skin also wrinkles and shrivels up, and is thrown off a second time, together with its fat. Within the space of three weeks, or a month, we see it new dressed three times. It now begins to eat again, and might be taken for a different creature; so much is the appearance of its head, form, and colour altered. After having eaten for some days, it falls again into a lethargy; in recovering from which it once more changes its coat, which makes the third since it came out of the shell. It still continues to eat some time; then, renouncing all food, it prepares itself a retreat; and draws out a silken thread, which it wraps round its body in the same manner as we wind thread round an oval piece of wood. It rests quietly in the bag it has spun for itself, until the end of a fortnight, when it would break through, and make its way out, if it were not prevented by putting it into an oven or hot sun, in order to kill it. These silk-bags are thrown into hot water, and stirred about with birch twigs, to loosen the ends of the silk, which is afterwards wound on reels made for the purpose.

Thus it is to a worm, or caterpillar, that we are indebted for the luxury of our clothing. This reflection is well calculated to humble our pride.

Can we be vain of the silk with which we are covered, when we consider to what we owe it, and how little we ourselves contribute towards it? Let us reflect, that even the most despicable things have been created for the advantage and use of mankind. A worm, which we scarcely deign to look at, becomes a blessing to whole provinces, a considerable object of trade, and a source of riches!

Many persons resemble the silkworm, in devoting a considerable part of their lives to the gratification of their appetite; but how few of them become useful to the world by their labours! May we henceforth zealously devote our strength and talents to the good of our fellow-creatures, and continually labour to promote their happiness.

## JULY IV.

### *The Rainbow.*

When the sun reflects its rays on drops of water falling from the clouds, and we are placed with our backs to the sun, and with the clouds opposite to us, we observe a rainbow. We may consider the drops of rain as little transparent globules, on which the rays fall, and are twice refracted, and once reflected. Hence proceed the different colours of the rainbow. They are seven in number, and appear in the following order: red, orange, yellow, green, blue, indigo, and violet. These colours appear so much the more lively, according as the cloud behind is

darker, and the drops of rain fall the closer. The drops continually falling produce a new rainbow every moment; and as each spectator has his particular situation whence he observes this phenomenon, it happens, that two men cannot, properly speaking, see the same rainbow; and this meteor can only last while the rain continues to fall.

If we consider the rainbow merely as a phenomenon of nature, it presents one of the most beautiful spectacles we can possibly conceive, and is one of the most magnificent pictures in the creation. But when we recollect that God has made this meteor a sign of his pardon, and of his gracious covenant with man, we shall find matter in it for the most edifying and pleasing reflections.

When the rain descends from one extremity of the horizon to the other, we cannot see a rainbow. Every time, therefore, that this beautiful meteor appears, we may be certain that we have no deluge to apprehend; as in a deluge it must rain violently from every part of the sky. Thus when the sky is only covered with clouds on one side, and the sun appears on the other, it is a sign that these dark clouds will disperse, and that the sky will soon become serene. This is also the reason why we cannot see a rainbow unless the sun be behind us, and the rain opposite to us. The sun and rain must appear at the same time in order to form a rainbow. No colours would be seen if the sky were too light; therefore, where it appears, the horizon must be covered with dark clouds. Neither could the

colours in the rainbow exist without the refraction of the rays of the sun upon it.

## JULY V.

### *Birds' Nests.*

The construction of birds' nests discovers many curious objects, which cannot be indifferent to a mind desirous of information. Who is there that would not admire those regular little edifices, composed of so many different materials, collected and arranged with so much care and judgement, constructed with such industry, elegance and neatness, without any other tool than a bill and two feet? It is not astonishing that men can erect great buildings according to the rules of art, when we consider that the artists are endued with reason, and have tools and materials in abundance. But that a bird, unprovided with any thing for the purpose, except its bill and feet, should be capable of uniting so much regularity, solidity, and judgement, in the construction of its nest, is what can never be too much admired.

Nothing is more wonderful than the nest of a goldfinch: the inside of it is lined with cotton-wool and fine silky thread; the outside is woven with thick moss, the colour of which resembles the bark of the tree on which the nest is laid, in order that it should be less observed, and less exposed to the eyes of passengers. There are some nests in which the hair, the down, and the straws, are curiously laid across and interwoven: there

are others the parts of which are neatly joined and tied together with a thread, which the bird makes out of flax, tow, and horse hair, or, more generally, of spiders' webs. Some birds, as the blackbird and lapwing, plaster the inside of their nest with a thin coat of mortar, which cements and keeps together all the bottom parts; and then, while it is fresh, they stick some moss to it, in order to make it warm and close. Swallows' nests are of a different construction: they neither require sticks, straws, nor ligaments; but they know how to compose a sort of cement, with which they make themselves nests, perfectly secure, neat, and convenient. Their method of moistening this cement is by going frequently to dip their breasts in the water, and then shaking it off upon it, till it is, thoroughly steeped, after which they work it up together with their bills. But the nests which deserve to be particularly admired are those of certain Indian birds, which they suspend, with great art, upon the branches of trees, in order to secure themselves from the pursuit of several animals and insects. In general, each species of birds has its particular manner of placing its nest. Some build them on houses, others on trees; some under the grass, others in the ground; but all in the manner best adapted for their security, the bringing up of their young, and the preservation of their species.

Such is the wonderful instinct of birds in the construction and situation of their nests; whence we may conclude with certainty that they cannot be mere machines. How much industry and intelligence, skill and sagacity, activity and patience,

do they show in the construction of their nests! Is it not clear, that in all their work they propose to themselves certain designs? They make their nest like a hollow hemisphere, that the heat may be the better concentred in it. The outside of the nest is covered with materials more or less coarse, not only to serve as a foundation, but also to keep out the wind, and prevent the entrance of insects: the inside is lined with more delicate materials, such as wool and down, to make it soft and warm for the tender inmates.

Is it not a species of reason which teaches the bird to place her nest so as to be sheltered from rain, and to be out of the reach of destructive animals? Where has she learned that she is to have eggs, and that these eggs will require a nest to prevent them from falling, and to keep them warm? Who has told her that the heat would not concentre round the eggs if the nest were larger, nor hold all the young ones if it were smaller? How does she know to make the nest in just proportion to the number of the young who are to be hatched? and how is she enabled to calculate her time so correctly that she never lays her eggs before her nest is finished? Nothing that has been hitherto said in answer to these questions is satisfactory; nor can this mystery in nature be explained: it requires a more perfect knowledge of animals than we possess. But of whatever nature the faculties of birds may be, it is at least certain that they result from a wise and powerful cause. And as these volatiles have not a capacity to know their Creator, let *us* employ our reason to increase in divine know-

ledge, and devote all our faculties to the praise of HIM in whom we live, and move, and have our being.

## JULY VI.

### *Variety of Pleasures in Nature.*

To whatever part of the creation we turn our eyes, we find something to interest and gratify either our senses, our imagination, or our reason. All nature combines to present us with a multitude of pleasing objects, and to procure for us those enjoyments which continually succeed each other. There is no part of the day but brings new pleasures either to our senses or our imagination. Whilst the sun illumines the horizon, plants, animals, and a thousand pleasing objects gratify our view; and when night spreads her sable mantle over the earth, we are charmed and transported by the majestic appearance of the firmament. Universal nature labours to surprise us with new pleasures;—the smallest insect, leaf, or grain of sand, presents a subject of admiration, and he who is not struck with this diversity, and does not acknowledge in it the goodness of God, must be blind and senseless indeed.

The same stream that irrigates the valley murmurs soft music to our ears, allays our thirst, and invites to soft repose. The shady forest, which defends us from the intense heat of the sun, where we enjoy a delightful coolness, and where we hear the melody of various birds, feeds, at the

same time, a multitude of animals, which are themselves food for us. The trees, whose beautiful blossoms lately perfumed the air, will soon produce the most delicious fruits; and the fields, now clothed with the ripening corn, will soon yield an abundant harvest. Nature presents no object to us that is not pleasing and useful in more than one respect. She clothes and adorns the earth with green, a colour the most agreeable to the eye, and adds to its beauty by diversifying its shades. How many different sorts of greens are there, which go from light to dark by a thousand degrees! Each species of plant has its peculiar colour. Landscapes covered with woods, bushes, corn, and herbage, afford a magnificent scene of verdure, in which the tints of this colour are infinitely varied; crossing and intersecting each other, till they become insensibly blended together, yet still preserving a perfect harmony. Each month affords us different plants and flowers. Those that have served their purpose are replaced by others; and thus successively prevent any void in the vegetable kingdom.

But to whom do we owe these numerous and varied gifts? Who is it that provides for our wants and pleasures with such goodness and munificence? Go and ask it of all nature. The hills and the valleys will reply; the earth points him out, and the heavens are a mirror in which we may contemplate his perfections. Storms and tempests announce him; the voice of thunder, the colours of the rainbow, the snow and rain, publish his wisdom and goodness. The verdant meadows, fields of golden grain, stupendous

mountains crowned with forests, trees laden with fruit, and gardens enamelled with flowers, all bear the impress of his hands. The birds celebrate him with their melodious notes. The sportive flocks, the stag bounding through the forest, the worm of the earth, and the monarch of the seas, that overturns and sinks the largest vessels; the terrific crocodile, the stately elephant, and all the numerous host of animals which people the air, the earth, and the sea, declare the existence and proclaim the glory of the Mighty God.

How unpardonable should we be, were we deaf to this general voice of nature! O let us, who are happy witnesses of the wonders of God, render him, in the presence of all his creatures, that homage of gratitude and adoration so justly due. Let us not harden our hearts against such marks of his goodness. Let us look around us. Every thing reminds us of his blessings, every thing incites to gratitude and joy; the rich lands where our food grows, the fields where our flocks graze, the forests which afford us shade and fuel. Let our souls be filled with it. Let the sense of our happiness, and of God's blessings, attend us in our walks, and follow us into solitude. We shall find that there is no satisfaction more heart-felt, more lasting, or more conformable to human nature, than the calm pleasures which the contemplation of the works of God afford. The more we observe the beauties of nature, the more we shall be persuaded that our God is a God of love and mercy; and that the Christian religion is a

source of joy, and a continual motive for grateful adoration.

## JULY VII.

### *Reflections on a Flower-Garden.*

Let us take a survey of the flower-garden, and reflect on the numerous and diversified beauties assembled in so small a space. The art and industry of man have made it a beautiful scene of the finest flowers. But what would it have been without culture and attention?—a wild desert, full of thorns and thistles. And precisely such would be the condition of the rising generation, if their minds were uninformed and their education neglected. But when children receive useful instructions, and are brought up under proper discipline, they resemble those lovely blossoms which now delight with their beauty, and will soon produce fruit beneficial to society.

Behold the *night-violet*, or Julian flower, which towards evening perfumes our gardens with its fragrance, in which it excels all others; but it has no beauty, and scarcely resembles a flower. It is little, and of a grey colour, tinged with green, so that it can scarcely be distinguished from the leaves: modest, without show or pretensions, it perfumes the whole garden, although it is not observed in the multitude; and it is difficult to believe that a flower so insignificant in appearance, can diffuse such aromatic odours. It may

be compared to a person who is not handsome, but whose want of beauty is amply compensated by the more solid endowments of a ready wit and enlarged mind. The righteous man often does good in secret, and sheds around him the perfume of good works; and when we wish to be acquainted with this beneficent character, we find that there is nothing peculiarly distinguishing either in his person, condition, or rank.

In the *carnation*, beauty and fragrance are both united; and it is certainly one of the most perfect of flowers. It almost equals the tulip in its colours, and surpasses it in the multitude of its leaves, and the elegance of its form. This flower is the emblem of a person who possesses both sense and beauty, and knows how to conciliate the love and respect of his fellow-creatures.

Let us now observe the *rose:* its colour, form, and perfume, all charm us; but it appears to be the slightest and most frail of any, and soon loses that beauty which distinguishes it from other flowers. This affords an useful lesson for those who excel only in beauty; and it ought to teach them not to be vain of their charms, or trust too much to their short-lived excellence.

In general, it is a melancholy thing to see, in this fine season, the ground already covered with so many faded and dead flowers. We ought not, however, to complain that Providence has not given them more stability. The world is a great theatre, where we are not always to see the same actors. It is right that those who have finished their parts should retire, and make room for

others. This is what the variety of God's works requires; a variety which constitutes part of their perfection. Besides, as we are agreeably affected by the charms of novelty, it is necessary that the former objects should give place to new ones. If flowers preserved their splendor during the whole year, their continual presence and sameness of appearance would satiate and disgust us; but, as they last only a few months, their absence causes us to long for their return. When we have seen an object in all its different points of view, and have, in some manner, exhausted its beauty, we become indifferent to it, and aspire after new pleasures. The variety and continual succession of earthly blessings, is therefore a mean which Providence employs to render our lives continually pleasant.

Such is worldly happiness. All is vanity. "All "flesh is as grass, and all the glory of man as the "flower of the field. The grass withereth, and "the flower thereof falleth." The lilies and roses of a beautiful face wither, as well as the flowers of the garden, and death leaves no vestige of them behind. Let us therefore wisely seek our peace and happiness in constant and durable blessings. Wisdom, virtue, and the advantages of true Christianity, never fade. They are inexhaustible sources of endless joy.

## JULY VIII.

### *The Phenomena of a Thunder-Storm.*

However formidable the phenomena of a thunder-storm may be, there is something so great and curious in them, that their different effects deserve our serious consideration; particularly as it often happens that we are prevented, by excessive fear, from contemplating this awful spectacle with sufficient attention.

When a collection of vapours forming a cloud becomes strongly electrified, and approaches so near to a high building or an unelectrified cloud, that a spark issues from it, an explosion takes place, which is called a clap of thunder, and the flash which we see is the lightning, or, as some term it, the thunder-bolt. Sometimes we only see a sudden and momentary flash; at other times it is a train of fire, taking different forms and directions. The explosion attending the lightning, shows that the vapours which occasion the thunder, by taking fire suddenly, agitate and dilate the air with violence. With the emission of each electric spark an explosion is heard; and the thunder is sometimes composed of several claps, or prolonged and multiplied by echoes. There is, generally, some interval of time between the lightning and the clap of thunder; by which we may, in some measure, judge of the greatness or nearness of the danger; for sound requires some time to reach the ear; while light goes through

the same space, and reaches our sight, much more swiftly. As soon therefore, as we see a flash of lightning, we have only to reckon the seconds on a watch, or how often our pulse beats between the flash and the clap. Whoever can reckon *ten* pulsations between the flash and the clap, is at the distance of a quarter of a league from the thunder cloud; for it is calculated that the sound takes nearly the time of forty pulsations in going a league. Lightning does not always pass in a direct line downwards, but often in a serpentine or zig zag direction, and sometimes does not flash till very near the ground. The electric matter which reaches the ground, or takes fire near it, never fails to strike. But it is not always strong enough to approach us; and, like an ill-charged bomb, disperses in the atmosphere, without doing any injury. When, on the contrary, the fiery exhalations reach the ground, they sometimes make terrible havoc. But, as uncultivated and desert places, where there are neither men nor habitations, occupy the largest part of our globe, lightning may fall many thousands of times without doing any real mischief. The course of the lightning is very singular, and always uncertain. It depends on the direction of the wind, the quantity of exhalations, &c. It passes wherever it can meet with combustible matter; as, when a grain of gunpowder is lighted, the flame runs along the train, and sets every thing it meets on fire.

We may judge of the prodigious force of the lightning by the wonderful effects it produces.

The heat of the flame is so intense, that it burns and consumes every thing that is combustible. It even melts metals; but often spares the substances contained in them, when they are sufficiently porous to admit of a passage through them. It is by the velocity of lightning that the bones of men and animals are sometimes calcined, while the flesh remains unhurt; that the strongest buildings are thrown down, trees split, or torn up by the root; the thickest walls pierced; and stones and rocks broken, and reduced to powder. To the rarefaction and violent motion of the air, produced by the heat and velocity of the lightning, we must attribute the death of those animals which are found suffocated, without any appearance of having been struck by lightning.

Let us reflect seriously on these strange and dreadful phenomena. We behold a heavy black cloud: it is the tabernacle of the Most High. It descends toward the earth: it is the Lord "who bows the heavens, and comes down with darkness under his feet." The wind rises, the storm begins; but God himself is in the whirlwind, and "walketh upon the wings of the wind." At his command the clouds disperse, and the thunder, lightning, and hail, are seen to fly abroad. "Listen attentively to his voice, and to the sound that goeth out of his mouth. He directeth it under the whole heaven, and his lightning unto the ends of the earth." But if his dreadful lightnings terrify the universe, his beneficent hand abundantly provides for all his creatures.

## JULY IX.

### *The Ants.*

THE ants, as well as the bees, may be considered as a little commonwealth, having a peculiar government, laws, and police. They live in a sort of town, divided into several streets which lead to different magazines. Their activity and industry, in collecting and using the materials they require for their nest, are truly admirable. They all unite in digging the earth, and carrying it out of their habitation. They then collect a quantity of grass, straw, and sticks, with which they form a heap, that, at first sight, appears very irregularly formed; but, through all this apparent disorder, much art may be discovered, when examined more attentively. Under the domes, or little hills, which cover them, and which are always so formed as to throw off the water, there are galleries, which communicate with each other, and may be considered as the streets of this little city. But what is particularly admirable, is, the care which the ants take of their eggs, of the worms when they come out, and of the chrysalis when formed. They convey them carefully from one place to another. They feed their young, and remove, with the tenderest solicitude, every thing that might hurt them. They even take care to preserve a proper degree of warmth about them. Their labour of collecting provisions, during the summer, has principally

for its object the support of their young; for as to themselves, they require no nourishment in winter, as they pass that season in sleep or in a state of insensibility. As soon as the young are excluded from the egg, the ants are busily employed in feeding them, and this is attended with considerable trouble. They generally have several houses, and they convey their young from one habitation to some other which they wish to people. According as the weather is hot or cold, dry or rainy, they bring their chrysalises near the surface of the earth, or remove them downward. In mild weather they bring them to the surface, and even sometimes after rain they expose them to the sun, or to a gentle dew after a long drought. But, at the approach of night, cold, or rain, they take their little ones in their paws, and carry them so low down into the earth, that it is sometimes necessary to dig above a foot deep in order to find them.

There are several sorts of these insects. The *wood-ants* are never found but in forests or thickets, and do no harm to fields. There are two species of these, the red and the black. Some settle in the ground and dry soils, and generally choose places where they find roots of fir-trees, or birch, to make their habitations. Others live in old trunks of trees above ground, high enough to be out of the reach of its moisture. They make themselves apartments in the cavities of the trunk, and cover them with straw and other things, to shelter them from snow or rain. The *field-ants* are also either red or black, like the former,

but much smaller; and these are found in corn-fields or common pasturages. In dry weather, they bury themselves very deep; but as soon as it becomes rainy, they elevate their habitations higher and higher, according as there is more or less damp; and, when it abates, they never fail of returning to their subterraneous apartments. It is also to be observed, that these ants acquire wings; and that towards autumn they are seen to fly in swarms over ditches, ponds, and other pieces of water.

But are these mischievous insects worthy our attention, spoiling, as they do, our fields and meadows? By their subterraneous works they make the ground hollow, tear it up, and prevent the plants and roots from growing. They are also reproached as being enemies to the bees and silkworms; they are supposed to hurt the flowers, and particularly the young trees; and it is said they devour the buds and shoots; and that, getting under the bark of trees, they gnaw them to the quick. For these reasons the ants are destroyed wherever they are found. If they gathered honey, though at the expense of a million of other creatures, they would be highly valued; but because their labours injure some useful plants, we think ourselves authorized to destroy them. But supposing, even, that they do some hurt, are they the less worthy of our attention on that account? Do none deserve our observation but such as are useful to us? Let us banish this prejudice. Even the ants may afford us instruction and amusement. The form of their limbs,

their industry, their indefatigable labour, the police of their republic, their tender care of their young, and perhaps a thousand other qualities which we are not acquainted with, might convince us of the wisdom of that great Being, who is their Creator as well as ours; for, of all the works of God, there is not one which has not its use, and is not worthy admiration, however useless, or even hurtful, it may appear at first sight. The Supreme Creator, by whom all things exist, has created nothing without design, nothing that has not its use and purpose. The trees have not a leaf, the meadows a blade of grass, nor the flowers a single fibre, that is useless.

## JULY X.

### *The Hail.*

HAIL is nothing but drops of rain, which, freezing in the air, fall in pieces of a spherical, oblong, or angular form. If it appear extraordinary, that, in the very warmest seasons of the year, vapours should freeze in the atmosphere, we must consider that even during the greatest heats, the superior part of the atmosphere is very cold. If this were not the case, how could the highest mountains remain the whole summer covered with snow? In the hottest parts of America, it is so severely cold on the top of very high mountains, that there is continual danger of being frozen; and of course, it would snow, from this extreme cold in the upper region of the atmosphere, in the very

middle of summer, if the snow did not melt, in falling, before it reached the ground. But when these particles of snow collect together, the drops begin to freeze; and as, in falling, they go rapidly through warmer regions of air, it happens that, before this warmth can have penetrated through them, their cold increases so as to make them entirely frozen. It might be imagined, that the cold, on the contrary, ought to abate in proportion as they pass through a warmer air; but what is the consequence in winter, when cold water, which has been exposed to the outward air, is brought into a very hot room?—it freezes, and becomes ice, which would not have happened if it had been put into a cold room. This is precisely the case in respect to the hail. When cold bodies pass suddenly into hot air, their cold increases to such a degree, as to turn them to ice. The saline particles which are more or less diffused through the atmosphere contribute very much to this effect. We need not, therefore, be surprised that storms are not always attended with hail, as it requires great abundance of saline vapours to occasion the sudden freezing of the drops of water. Though hail is more frequent in summer-time, it falls also in other seasons; for, as in every part of the year the saline exhalations may ferment in the atmosphere, so it may hail in winter, autumn, or spring.

Hailstones are sometimes round, at other times concave and hemispherical, and often conic and angular; and their ordinary size is that of small shot, though it sometimes greatly exceeds. The

difference observable in the form and size of hailstones may proceed from accidental causes. Winds, particularly those which are impetuous and blow in contrary directions, may be supposed to contribute much to this. Besides, a hailstone, in falling, may meet with several other cold particles which considerably increase its size; and often the small hailstones meet others, and, in joining together, form into large ones. When hailstones are very large, they certainly do inexpressible mischief to crops, fruits, and buildings; but this does not authorize us to regard them as a scourge from heaven, or a punishment from the Almighty. If a violent hail-storm sometimes lays waste acres of land, and breaks thousands of windows, this mischief, however great it may be, is nothing in comparison of the advantages which accrue to us from it. Hail evidently cools the air in the burning heats of summer. And it is very remarkable, that, though all the meteors appear to succeed each other without any regularity, and are all different one year from another, this apparent disorder never fails to produce fertility.

Here, again, O God! thou showest thy goodness and wisdom! may we glorify thee even in the midst of hail and storms; for thy beneficent hand worketh admirable things, and never ceaseth to enrich and fertilize the earth.

## JULY XI.

### *Utility of Storms.*

A DUTY, which ought to appear to us the more indispensable because it is neglected by many thoughtless, ignorant, and ungrateful people, is that of considering all the phenomena of nature in the light which may most sensibly impress our minds with a becoming sense of the wisdom and goodness of our heavenly Father. It is true, that God sometimes makes use of natural phenomena to punish the sins of mankind; but these particular cases do not prove that He does not chiefly, and in general, propose to himself the good of the whole. All nature affords undeniable proofs of this. At present let us contemplate a single phenomenon particularly adapted to convince us of it, and concerning which we require that our common opinions should be rectified.

Are we not, many of us, accustomed from our infancy to pronounce the words *thunder* and *lightning* with terror? We are so unjust, that we only think of those very rare cases when storms are fatal to a very small part of the universe, while we are totally insensible to the great advantages which result from them, taken in the whole. Alas! we should soon change our language, if God, provoked at our ingratitude and complaints, were to deprive us of the blessings which they produce. It is true, we are not capable of pointing out all the advantages which accrue from

them; but the little we do know may suffice to fill our hearts with gratitude towards our great Benefactor.

Let us represent to ourselves an atmosphere loaded with noxious and pestilential vapours, which thicken more and more by the continual exhalations of earthly bodies, so many of which are corrupt and poisonous. This air we must necessarily respire; and the preservation or destruction of our being depends on it. The salubrity or unwholesomeness of the air gives us life or death. We feel how we are oppressed in the stifling heat of summer: with what difficulty we breathe! what uneasiness we experience! Is it not then a great blessing, when a salutary storm comes to purify the air from all noxious vapours; and, by lighting up the saline and sulphureous particles, prevent their dangerous effects, cool the air, which recovers its elasticity, and restores us to our usual facility of breathing? Were it not for occasional storms, dangerous exhalations would be more and more corrupted and multiplied, men and animals would perish by thousands, and the earth itself would soon become a universal cemetery. Which is then the most reasonable, to fear or to wish for storms? to murmur at the slight mischief they may sometimes occasion, or to bless God for the precious advantages they procure to the world at large? Let us add, that not only men and animals are benefited by purifying the air, but that it is also very useful to the vegetables. Experience teaches that the rain which falls during a thunder-storm is more

conducive than any other to the fertilization of the earth. The saline and sulphureous particles which fill the atmosphere during a storm, are drawn down by the rain, and become excellent nourishment for plants; without mentioning the number of little worms, seeds, and insects, which are also drawn down in thunder-showers, and are, with the help of a microscope, visible in the drops of water.

Reflections of this kind may serve to moderate that excessive fear we have of thunder:—a fear which too plainly shows how little confidence we have in God. Instead of filling our minds with frightful and terrible ideas, let us accustom ourselves to consider a storm as a sublime and magnificent spectacle. Instead of speaking of the misfortunes occasioned by thunder, let us reflect on the necessity and great utility of storms. Instead of praying to God that there may be none, let us pray that he may vouchsafe to send them from time to time; or rather let us leave it entirely to that great Being who always governs the world with wisdom and goodness. Every time a storm arises, let us say, in the fulness of our hearts, and with entire faith, Almighty God! it is thou who commandest the thunder, and directest the lightning. We are in thy hands, and it depends on thee either to save or to destroy us. At thy command the tempest shall either fertilize or destroy our fields. Thou art great, O Lord! and thy power is inexpressible. How can we attempt to resist thee, or whither is it possible to flee from thy avenging justice? But thou art a merciful

Father, and we are thine adopted children. Thou speakest to us in thunder; but blessings are in the sound.

## JULY XII.

### *The Earth, and its Original Constitution.*

God has adapted the earth for the production and growth of herbs, plants, and trees. It is sufficiently compact to contain and hold the vegetables so firm that the winds cannot sweep them away, and yet it is light and movable enough for the plants to extend their roots in it, and draw out the moisture and nutritious juices. When the surface of the earth is barren and dry, this lightness gives power to the juices to rise up, as in the capillary vessels, to furnish the trees with the nourishment they require. Besides this, the earth abounds with different juices which serve for the growth of plants; and that every species of vegetables may flourish, we find there are different sorts of earth, which answer various purposes; such as potter's earth, clay, chalk, and gravel. Some serve to make bricks, others to construct buildings, and form earthenware, porcelain, &c. while some are used in dying and medicine.

The inequalities on the earth's surface are productive of considerable advantages. The lofty mountains serve as retreats for a variety of animals, and, by breaking the violence of the winds, they produce a variety of wholesome plants

and fruits, which would not thrive in the valleys or on the plains. They also contain useful metals and fossils; and from them proceed those springs and rivers which are produced by rain, melted snow, and other vapours. The stones that are included in the earth serve to build walls, and to make lime and glass. As to metals, their uses are numberless: let us only think of the many tools our workmen and artists require; the utensils and furniture of every sort made of them, which furnish us with so many conveniences and ornaments. We also draw considerable advantages from the hardness and weight of these bodies. No person is ignorant of the use of minerals: salt serves to season our food, and to keep it from corrupting; the sulphureous particles of bodies render them combustible. Even volcanoes and earthquakes, whatever mischief they sometimes occasion, are still useful and necessary. If fire did not consume the sulphureous exhalations, they would spread too much in the air, and would render it unwholesome; many warm baths would not exist; and many minerals and metals would never be produced. We may impute it to our ignorance, if so many things appear useless. At the sight of certain phenomena in nature which are sometimes noxious, we ought always to remember this maxim: If God now and then permit certain imperfections to take place, it is that they may contribute to the greater perfection of the whole. To judge aright of the works of God, and to acknowledge his wisdom in them, we must not only consider them in one

point of view, but examine them both in their constituent parts, and their total combination. Many things which we now consider as injurious, are notwithstanding of real utility. Others appear superfluous; and yet, if they were wanting, they would leave a chasm in the plan of the creation. How many things appear to us insignificant, only because we do not know the real use of them! Put a loadstone into the hands of a man who is ignorant of its virtue, and he will scarcely deign to look at it: but tell him that we owe to that stone the progress of navigation, and the discovery of a new world, and he will then be of a very different opinion. It is the same with respect to a million of things which we despise, or judge ill of, because we do not know the use of them, nor see the connexion they have with the whole of creation.

O Lord! the earth is full of thy goodness. All that is in and upon it, even the dust itself, is arranged with infinite wisdom. How long have we travelled on earth, and how many of thy blessings have we witnessed! May we aspire continually after an acquaintance with thy perfections, and pay thee that just tribute of grateful praise which we owe, for unnumbered instances of divine mercy and beneficence.

## JULY XIII.

### *The Phases of the Moon.*

OBSERVATION has demonstrated, that the moon has a peculiar motion, by which she turns round the earth from west to east. For, after having placed herself between us and the sun, she retires from under that body, and continues to go back towards the east, changing from day to day her place of rising. At the end of fifteen days she will have reached the most eastern part of the horizon at the time the sun sets with us; and she is then said to be in opposition. In the evening, she rises above our horizon when the sun retires below it; and in the morning, as the sun rises, she sets. If she then continue to traverse the circle which she has begun round the earth, and the half of which is already accomplished, she will visibly remove from the point of her opposition to the sun, and will gradually approach nearer to that luminary. We shall then see her later than when in opposition, till, at length, she will only appear a little before sunrise.

The revolution of the moon round the earth explains why she rises and sets at such different times, and why her phases are so various, and yet so regular. Every body knows that a globe illuminated by the sun, or by a flambeau, can only receive the light immediately on one side. We readily perceive, that the moon is a sphere which

receives her light from the sun. When, therefore, she is in conjunction—that is, placed between the sun and us—she turns her illuminated side towards the sun, and her dark side towards us, and is then, of course, invisible. She then rises and sets with the sun, in the same region of the sky, and is called new moon, or the conjunction. But when the moon retires from under the sun, and goes back towards the east, she has no longer all her dark side turned towards us: a small part of it, a little border of the illuminated disk, begins to appear. This luminous border is seen on the right side, towards sun-set, or even before it; and the horns or points of this crescent are turned to the left, facing the east. The farther the moon recedes from the sun, the more visible she becomes. At the end of seven days, when she has performed a quarter of her course round the earth, she discovers more and more of her illumined side, till she shows us half of it. The enlightened part is then turned towards the sun, and the dark part casts no light on the earth. Exactly half the moon is then illuminated. The half of that half can only be the quarter of her whole globe, and it is in reality this quarter which appears to us. The moon is then said to be in her first quarter.

In proportion as the moon recedes from the sun, and the earth comes nearly between them, the light occupies a greater space in that part of the moon which faces us. At the end of seven days, reckoning from the first quarter, she is almost directly opposite to the sun, and then her

whole illumined disk presents itself to us. She then rises in the east precisely at the moment the sun sets in the west, and we have a *full moon*. The next day the enlightened part is a little turned away from us; so that we no longer see the full illumined face. The light gradually leaves the western side, extending itself in proportion on the half not facing the earth. This is the *wane* or *decrease* of the moon; and the further she advances forward, the more her dark part increases, till at length half of it is turned toward the earth, and consequently half her luminous side. She has then the form of a semicircle, and is said to be in her *last quarter*.

By the admirable harmony which subsists between the motion of this planet on her own axis and her course round the sun, it so happens, that the moon always presents to us the same hemisphere that she has shown from her first creation. During so many thousands of years, this globe has constantly, and without deviating from the same course, finished her revolution in twenty-seven days and eight hours. Regularly, and at certain periods, she has enlightened, sometimes our nights, and sometimes those of remote countries. With how much goodness has it pleased Divine Wisdom to grant to our earth a faithful companion to illumine almost half our nights! Alas! we are not properly sensible of the value of this wise appointment of the Creator. But there are people who are more so than we, and to whom this light is indispensable. *They* must certainly be more grateful for this blessing than we are.

The continual changes of the moon, both in respect to her phases and her course, are lively emblems of the revolutions to which all terrestrial things are liable. Sometimes health, spirits, affluence, and a thousand other blessings, concur to make us happy, and we walk, as it were, in a blaze of light; but at the end of a few days all this splendor disappears, and there remains only the sad remembrance of the fickle and transitory blessings we have enjoyed. How ardently, therefore, should we wish to pass from this uncertain world to those happy regions where all the blessings we shall enjoy, will appear the more excellent, as they will never be subject to mutation or decay!

## JULY XIV.

### *Mineral Waters.*

WHETHER we consider mineral waters in respect to their formation, or the benefits that result from them, they are certainly valuable blessings bestowed upon us by the Almighty. But even the places where these salutary springs flow, are seldom consecrated to praise and gratitude. The following reflections are calculated to render us more grateful, in future, to our Heavenly Benefactor.

In the first place, the sources whence we draw the common salt which seasons our food are highly deserving of attention. It is probable that they originate from that mineral salt which

the waters dissolve under ground. Mineral hot baths are equally remarkable; and these are so numerous, that in Germany alone they reckon nearly a hundred and twenty; but, in some of them, the water is so hot, that it requires to stand for twelve or eighteen hours before it is of a proper temperature to bathe in. What is the cause of this extraordinary heat? It certainly is not the sun; because in that case, the waters would only preserve their heat in the day time, whilst exposed to the solar beams, and they would grow cold in the night or in winter. Neither can this heat be attributed to subterraneous fires; for then it would still be necessary to account for the medicinal virtue of these baths. The most simple cause we can assign is, that the waters passing through earth strongly impregnated with sulphureous, pyritous, and metallic substances, acquire this degree of heat. When the water falls into those quarries, the sulphureous and ferruginous particles which it dissolves, take fire by the friction and re-action of their principles, and communicate this heat to the water which runs over them.

Medicinal waters, particularly those which are acidulated, are produced by dissolving and mixing with the minerals they wash away. They are found particularly in places where there is abundance of iron, copper, sulphur, or charcoal. Hence there is such difference both in the effect and taste of them, in proportion as they are more or less impregnated with these. They are bitter when they are produced by bitter roots, saltpetre, or copper; they are cold when they come out of

the rocks, or are impregnated with sal-ammoniac, saltpetre, alum, &c. Oily and bituminous substances make them oleaginous; brimstone mixed with acids renders them sulphureous.

Let us admire that divine goodness which has prepared for man those salutary and inexhaustible springs. Mineral waters may certainly answer many other purposes; but it is certain they were produced for the health and preservation of mankind. It is for man that the Lord has caused these beneficent waters to spring up. Let us, therefore, acknowledge his goodness, and be sensibly affected by it. Let those especially who have experienced their strengthening and salutary virtue, be deeply penetrated with love and gratitude to their Heavenly Father. Let them glorify him, by imitating his example; and let their riches become sources of life and consolation to their fellow-creatures in necessity.

## JUNE XV.

### *Continual Activity of Nature in the Vegetable Kingdom.*

WHOEVER wishes to know why nature is never idle through the course of the whole year, has only to reflect on the numberless advantages which result from this constant activity. Vegetables were designed for the use of men and animals: both for food and pleasure to the former, as food only to the latter. The beneficent Cre-

ator, in order to bestow nourishment on man in the most pleasing manner, ordained, that the plants, instead of coming all at once, should appear in a regular succession, and this is indispensably necessary to the accomplishment of the great end designed. How could men find time to get in their different crops and harvests, if every thing were ripe at the same time? How could all of them be preserved, as many are of very short duration, and soon lose their taste and virtue? What would then become of the pleasing sensations which they afford both to our sight and palate? What flavour would cherries and other summer fruits have, were we to eat them in winter, covered with snow and ice? Would not wine itself be changed to vinegar, if the grapes were to ripen in the heats of summer? And what would become of so many millions of animals, whose preservation the beneficent Creator watches over, as well as that of mankind? how could they subsist, if all the productions of the earth came to maturity at the same time?

There are a hundred species of insects which feed only on flowers: how could *they* subsist if their aliment lasted only one or two months? Could they gather enough to have always sufficient food? It is true, that most insects find none in winter; but then they fall into a sound sleep, and do not require any; which would not be the case in summer, as the heat would waken them. It is therefore certain, that if nature were planned otherwise, men, as well as animals, would not only suffer by it, but even perish with hunger:

and we may safely assert, that their support is one of the chief designs of Providence in the constant activity of the vegetable kingdom.

If we next reflect on the pleasures of sight and smell, which God has pleased to grant to man, we shall find, that for this purpose also it was requisite that nature should be thus arranged. It was not only necessary that the flowers should be displayed in full beauty, but that there should be some all the year for our continual enjoyment. In spring, when we go into the country, to contemplate the various productions which the Creator causes to spring up for our food, we behold the trees in full bloom. Towards summer, when farmers are chiefly occupied with their corn, a thousand beautiful flowers charm the sight. These appear successively, and replace each other the whole season, as long as man can enjoy this pleasure. At last, when the cold winter arrives, and shuts us up in our houses, nature produces other vegetables, which though not fascinating to the sight, have yet many considerable advantages. From all this it appears, that the pleasures and comforts of mankind are some of the great ends proposed by God in the plan of nature. Every thing is so ordained as to provide sufficient nourishment for men and animals, and also that the former should enjoy as many pleasures and comforts as possible: consequently, some plants produce their blossoms and fruit in spring, others in summer, and others in autumn or winter. Thus each has its allotted time, and appears precisely when most useful. Scarcely have some

performed their service, when others appear in full beauty. We behold millions of plants, and all follow the same law.

Every thing that bears the impress of God's creation is formed in the same wise and regular order, though the weakness of our understanding may sometimes prevent us from discovering their uses and designs. Let us, therefore, bless our Creator, and give him glory for all things; and let us acknowledge, that in all the revolutions of the vegetable kingdom, he has our welfare in view. With what gratitude should this reflection inspire us! and what sweet satisfaction should we feel every time we contemplate the beauties of nature!

## JULY XVI.

### *The Beauty and Utility of Meadows and Fields.*

THE sight of a large and well-cultivated garden, during these summer days, affords a lively pleasure, of which those people who remain shut up in their apartments can form no idea. But to the true admirer of nature the most beautifully-disposed garden has no charms equal to those of the meadows smiling in rural simplicity. The stately tulip, the elegant narcissus, and the beautiful hyacinth, all must yield to the sweetly simple flowers which enamel the fertile valley. Whatever charms the flowers may have which are cultivated in our gardens, those in the fields are still more pleasing: the former charm by their

beauty; but the latter unite both beauty and utility. Is it not true, that in these long and uniform gravel walks, these arbours, clumps of trees, and beds of flowers, and these enclosures, surrounding all;—is it not true, that we feel an unpleasant degree of confinement and restriction? Whatever limits our view, seems to set bounds to our liberty; and we become more independent, and more at ease, in proportion as our walk enlarges and lengthens before us. In the country, during summer, fertile and beauteous nature is, every moment, varying her appearance; whereas, in our ornamental gardens, we continually behold the same objects. Even their order and regularity prevent us from being long pleased with them. They have nothing new to offer us, and we tire of them. On the contrary, the eye wanders with pleasure over objects continually diversified, and extending as far as the sight can reach. To afford us this enjoyment, the Author of nature has ordained that in most places the ground should be smooth and even; but that we might also have pleasing distant prospects, our horizon is surrounded with rising hills. He has done still more: he has spared us the trouble of cultivating and watering those flowery gardens. An innumerable multitude of seeds are sown in them, which produce a verdure scarcely ever interrupted, or which is, at least, easily renewed.

The numerous varieties of plants which cover a field are not merely designed to gratify the sight; each has its peculiar seed, blossom, virtues, and beauties. It is true, that the same

species of herbs is prodigiously multiplied in each field; but, perhaps, we do not take two steps without passing over a hundred different sorts, each of which has its peculiar use. To the pleasure afforded by a view of the fields, our beneficent Creator has added considerable advantages: they produce plants for our food, and a wonderful number of simples, which serve for medicines. But, perhaps, the greatest advantage is the feeding, without expense, those animals we can the least dispense with. The ox, whose flesh affords us so wholesome an aliment, and by whose labour our grounds are cultivated, has no other food than the produce of the field. The horse, whose services are innumerable, demands no other recompense than the sweet grass, or a sufficient quantity of hay. And the cow, whose milk is one of the greatest supports of life, requires nothing more. The field is the most complete inheritance, it is even preferable to cultivated lands, as its produce is certain, and requires neither sowing nor labour: it only costs the slight trouble of gathering what it yields. Its productions are not casual, for it seldom happens that fields are destroyed by drought or inundations.

But it is a melancholy thing, that men, who are generally so inattentive, so insensible to the blessings of God, should be equally so in reference to this. We look upon grass with contempt or indifference, perhaps, because it grows under our feet, and has not been made the object of our care and culture. But, whatever may be the cause of our indifference, it is certainly in-

excusable. Would to God, that, at the sight of our meadows enamelled with flowers, we were sensibly touched with the goodness of the Creator, who, with a bountiful hand, pours out abundance for men and animals! O that we were well convinced that his mercy is every where, and that there is not a corner of the earth where we may not discover vestiges of his good providence! Yes, every country, every soil, the good and the bad, the sandy and the marshy, the stony and the moist, all equally proclaim the beneficence of the Preserver of the universe.

May we never hereafter contemplate these rural scenes but with appropriate sentiments of grateful piety. While reposing on a flowery bank, and surveying the adjacent landscape, may our hearts dilate with thankfulness, and soar, in hymns of praise, toward our indulgent Father!

How lovely, how fascinating are the flowers which encompass us by millions? The choirs of feathered songsters, the verdant and enamelled fields, the impervious thickets, and towering forests, announce the goodness, and proclaim the munificence of the great Parent of nature.

## JULY XVII.

### *The Morning Twilight.*

It cannot be doubted, that this phenomenon, which we daily behold, is, with others, designed for our benefit. Twilight is nothing

more than a prolongation of day, which at one time prepares our eyes to bear the splendor of the rising sun; at another to support the approaches of midnight darkness. The twilight, however, is not always the same, but differs according to climates and seasons. Towards the poles it continues longer than in the torrid zone, where the inhabitants see the sun rise directly above the horizon, and sink in the same direction beneath the lower hemisphere; by which means they are suddenly left in total darkness. On the contrary, the sun reflecting his rays obliquely towards the poles, and not sinking far below the horizon of the neighbouring people, their nights, though long, are almost always attended with a twilight which is in some degree luminous. It is a happiness for the former to have scarcely any twilight, and for the others to have an almost continual dawn.

As for us, who are placed nearly at an equal distance from the torrid and frigid zones, we plainly observe that our twilight becomes shorter in proportion as the days shorten; and that it increases as the days lengthen. We enjoy daylight an hour or more after the sun is set, and for the same space before he rises above the horizon. This useful arrangement is owing to the atmosphere, which, to a certain height, surrounds the earth every where. And such is its nature, that the rays of light which pass through it perpendicularly are not diverted from their straight direction; but when a ray enters obliquely or sideways, instead of passing in a direct

line; it bends, or is refracted, descending a little lower: so that the greater number of rays which penetrate the atmosphere on the side of the earth, fall back, in consequence of this inflection, upon it; and thus, instead of passing directly through the air, they are bent by it, and directed towards the earth. Thus, when the sun approaches our horizon, many of his rays which pass by us, and are not sent directly towards us, meet the mass of air which surrounds us, and bending in that mass, they reach our eyes; so that we see day-light, long before the sun himself appears.

This refraction of light in the body of air which surrounds us, is a work equally full of wisdom and goodness for all the people of the earth; but it is a particular blessing for those who inhabit the frigid zones; as they would be plunged in frightful darkness for several months together, if they had no twilight. Perhaps this explanation of the origin of twilight may not be intelligible to every body; but let us leave to philosophers a farther detail of it, and limit ourselves to contemplating it as reasonable beings, and as Christians. To do this, nothing is requisite but an upright heart, willing to glorify its Creator. The honest, though ignorant, Christian, may possibly be wiser than many philosophers; who, while they explain and calculate this phenomenon of the twilight, lose sight of that Great Being who gives to man the light of day.

## JULY XVIII.

### *The Evening Twilight.*

THE evening twilight is that faint light which, after sun-set, is still visible in our atmosphere, particularly in the west: it is occasioned partly by the refraction and reflection of the rays of the sun in our atmosphere, and partly by the atmosphere of the sun itself, known by the name of zodiacal light, which sometimes appears, but particularly towards evening in spring, and in autumn towards morning. When the sky is serene, the smallest stars are visible at twilight, which continues from sun-set till dark night, generally lasting about two hours. In the island of Senegal, where the nights and days are almost always equal, the twilight lasts but a few moments. The interval between sun-set and the darkness of night, is scarcely more than a quarter of an hour: thus, as soon as the sun has sunk ten or fifteen degrees below the horizon, the whole country is immersed in profound darkness. In our climate the shortest twilight is about the first of March, and the eleventh of October.

When the northern declension of the sun, and that of the equator under the horizon, are such that the sun descends only eighteen degrees below the horizon, the twilight lasts all night. This is the reason, that, in the summer solstice, we have scarcely any night in our countries; and that there is none in the more northern climates, though the sun is below the horizon.

The advantages which accrue to us and many other creatures from the twilight, is very evident. To pass immediately from broad day to dark night, would be very inconvenient. So sudden a change would injure, if not destroy, the organs of sight. Travellers would lose their way, surprised with sudden night; and many birds be in danger of perishing. The infinitely wise Author of nature has prevented all these inconveniences by giving our earth an atmosphere, which precludes a sudden disappearance of light, although the sun be sunk below the horizon. And thus through the medium of twilight, we pass gently and gradually from day to night.

## JULY XIX.

### *The Ephemeral Fly.*

This insect is called ephemeral, on account of the short duration of its life in the state of a fly. It is one of the prettiest species of flies, and undergoes five transformations:—First, the egg contains the principles of its life. It comes out a caterpillar, which turns into a chrysalis, afterwards into a nympha, and lastly into a fly, which lays its eggs on the water, where the heat of the sun hatches them. Each egg produces a small red worm, which moves in a serpentine manner. They are found all summer in great abundance on ponds and marshy places; but, as soon as the water begins to grow cold, the worm makes it-

self a bag, or little sheath, where it passes the winter. Towards the end of that season it ceases to be a worm: it enters into its third state, that of a chrysalis. It then sleeps till spring: and gradually becomes a beautiful nympha, or a sort of mummy, something in the form of a fish. On the day of its metamorphosis, the nympha at first appears lifeless and inactive. At the end of six hours, the head shows itself, and gradually rises to the surface of the water. The body afterwards disengages itself slowly and by degrees, till at last the whole animal comes out of the shell. The new-born fly remains for some minutes motionless on the water: then gradually revives, and feebly stirs its wings; then moves them quicker, and tries first to walk and then to fly. As these flies are all hatched nearly at the same moment, they are seen in swarms, jumping and playing on the surface of the water for about two hours. The male and female then seek each other, and unite for two more hours. Afterwards they return to their sports, lay their eggs, and soon after fall down and die. Thus they terminate their short life at the end of five or six hours: and never survive the day that gave them birth.

Let the history of these little animals teach us how false a judgement we form of the duration of our lives, in comparison of eternity. Suppose that one of these flies had preserved its active and laborious life for *twelve* hours, and of course had arrived at extreme age, according to its nature, and in comparison with its companions

most of which had died at noon. If this aged insect could speak, a little before its death, probably towards sun-set, it would thus address its assembled friends:—"I now perceive that even the longest life must end. The term of mine is arrived, and I regret it not: for old age is already become burthensome, and I can no longer discover any thing new under the sun. All that I have seen during the course of my long life, has taught me, that there is nothing here certain or durable. A whole generation of ephemera have been destroyed by a violent storm: the coolness of the air has carried off numbers of youth in their bloom. I lived in the first ages of the world; and have conversed with insects much more respectable, robust, and better informed, than any of the present generation. I can also assert for truth, that the sun which now appears so near the earth, I have seen in the middle of the sky. Its light was formerly far more brilliant than at present; and our ancestors were much more sober and virtuous than we are. I have seen many things. I have had a long experience, and have outlived all my contemporaries. My life began exactly when the sun was rising. During countless years it traversed the sky in majestic splendor, and diffused its benign warmth in all directions. But now that it is upon the decline, and going to set, I foresee that the end of all things is at hand. O, my friends! how did I once flatter myself that my life would be eternal! How beautiful were the cells I formed for my abode! What hopes I founded on

my good constitution, my strength, my activity, and the use of my wings. But, after all, I have lived long enough, and none of those I leave behind me will run so long and so delightful a course as mine."

Thus might an insect speak which had lived nearly *twelve hours* upon the earth. But might not a man who had lived *fourscore years* use much the same language? The difference between twelve hours and fourscore years is nothing in reference to the comparison between *time* and *eternity*. Do we, in general, make a better use of our fourscore years than the ephemeral fly of its twelve hours?

## JULY XX.

*Nothing perishes in Nature.*

Were there any thing in the world which perished without being of use, we might doubt the wisdom of the Divine government. But we have reason to believe, that throughout the immense circle of creation, there is nothing lost, not even the smallest grain of dust; but that every thing exists for certain purposes, and that each answers in its way the design for which it was created.

The seed which falls from a flower is not destroyed: it is often carried away by the wind to make other flowers fruitful, or it takes root in the ground and becomes a plant. Other seeds

or fruit which fall, are eaten by birds and other creatures. They mix with their juices, and go through digestion, and the necessary preparation to make manure for the fields, for the use of men and animals. Certain things, it is true, corrupt and are decomposed; but then they become parts of some other substance, and serve, under a new form, the designs for which they would not have been proper in their former state; because, in order to do so, they require being prepared by different transformations, and by mixing with other substances. The butterfly would never have produced its like, if it had not at first been a worm. No animal whatever, as we now see it, could have been produced, if its germ had not pre-existed in the first animal of its species. Nothing, therefore, perishes in nature: things are only separated or dissolved in order to appear in a new form, and to become parts of some other substance. Each grain of dust may be called the germ of a new creature, and holds its proper place in the chain of beings, which has been produced for the perfection of the whole. If you take a handful of the sand you tread on, you perhaps destroy the lives of a million of insects which were the inhabitants of this sand. Were we better acquainted with the elementary particles of matter, we might determine with more certainty what the other substances were in which they lay concealed before, and into the composition of which they entered.

"But may not abortions, or children who die in their birth, be considered as creatures, that

perish without having been of any use?" Certainly not: they fulfil, in their way, the design of the Creator, and are prepared by many changes for their future state. Nature does every thing gradually. Man was first a child, the tree a shrub. Each creature exercises its powers during its short duration, and prepares itself for a new state. The step that man must take to pass from the mere sensitive life of childhood to the rational life of a riper age, is certainly not greater than that which the child must take in its mother's womb in learning to feel. And we can no more say, that such a child has not answered the purpose for which it was created, than we can say it of man, because he may not here below have answered those designs which he is not to fulfil till he becomes an inhabitant of heaven. Each creature fulfils, in its way, and in proportion to its faculties, the end proposed. Like the wheels of a watch, some move quick, others slowly; but all tend, directly or indirectly, to the great end of their existence, and contribute according to their power towards the general plan formed by God.

We may meet many things in nature which will, at first sight, appear useless, and, consequently, to have been produced without design. We may imagine that others have been entirely destroyed or annihilated. But let us not judge rashly, nor be too precipitate in arraigning the ways of Providence. Let us rather believe, that all we behold, however strange and unconnected it may appear, is planned in the wisest manner;

and that God fulfils his designs, even when we, blind and ignorant mortals, can form no idea of the end he proposes.

Let us be assured that the hand of the Lord has planned every thing with the most consummate wisdom. Look around: all is connected; all is in its proper place; and nothing is owing to chance. There is not a thing in the world useless, even when turned to dust. Nothing in nature is lost; nothing perishes; not even the smallest leaf; not a grain of sand: not one of those insects invisible to the human eye; not one of the seeds blown away by a zephyr. That stupendous firmament, where the sun shines with such dazzling lustre; that swarm of insects which play in the solar-beams, and which we respire without knowing it; all appeared at the word of the Creator. All is in its proper place; all exists never to end; all is right; all is perfect throughout the universe which the Most High has created; and yet rash and presumptuous men dare to criticise his works! Let us not imitate such madness. Let us glorify God, and secure our own peace, by believing that nothing which ever was created perishes.—Even our bodies perish not. Though they wear, and shall hereafter be entirely decomposed in the grave, they shall assuredly be re-united, and possess new life in the morning of the resurrection.

## JULY XXI.

### *Difference of Zones.*

THE Creator having made our earth in a spherical form, and having impressed upon it a double motion, it necessarily followed, that the regions of the earth should differ from each other, not only in the temperature of the air and the seasons, but also in the animals and plants which they produce. In certain countries there is but one season: summer is continual there, and every day is as hot as our warmest summer days. Those countries are situated in the middle of the globe, and occupy the space called the *torrid zone*. The finest and richest fruits which nature produces, grow there; and there also she has most liberally poured forth her treasures. The days and nights are of equal length most of the year.

There are countries, on the contrary, in which a cold more intense than that of our most rigorous winters, prevails during the greatest part of the year; and it is only during a few weeks that there is heat enough for the few trees and herbs which are found there, to grow and become green: but in those *frigid zones*, neither the trees nor the earth produce such fruits as are proper for the nourishment of man. The greatest inequality of day and night prevails; both lasting in their turn for whole months together.

The two *temperate zones*, placed between the

torrid and the frigid zones, occupy the greatest part of our globe. In those countries, four seasons appear more or less distinctly, according as they approach the torrid or the frigid zone. These seasons are, the *spring*, when the trees and plants bud and blossom, the heat is moderate, and the days and nights nearly equal; the *summer*, during which the fruits of the field and trees ripen, the heat is more intense, and the days become visibly longer than the nights; the *autumn*, when the fruits and seeds fall off, and the grass withers, the days and nights again become equal, and the heat daily diminishes; the *winter*, during which vegetation seems almost wholly suspended, the nights lengthen, and the cold increases in a greater or less degree.

The countries of the temperate zones are so situated, that in those which are near one of the sides of the torrid zone, the seasons are directly contrary to those of the other temperate zone; for when it is summer in one, it is winter in the other. In these regions nature seems to have produced the greatest varieties, with respect to both vegetable and animal productions. Wine is peculiar to these countries; for the vine cannot be cultivated, either in intensely hot, or severely cold, climates. Mankind, in particular, possess many advantages under such climates. The inhabitants of the frigid zone are stupid, and low in stature: those of the torrid zone are of a weaker constitution, have warmer passions, and less natural and intellectual powers, than the inhabitants of the temperate zones.

However varied the regions of our earth may be, the Creator has provided for the happiness of all who inhabit them. He ordains that each country should produce what is most requisite, according to the nature of the climate. A worm, which feeds on the leaves of the mulberry-tree, spins for the people of the torrid zone that silk of which they form their clothing: and a tree, as well as a shrub, bears a kind of pod or husk filled with cotton, of which light stuffs are manufactured. On the other hand, the cold regions abound in quadrupeds, the skins of which serve for pelisses to the inhabitants of the north; and they are also furnished with thick forests, which supply them with abundance of fuel. That the blood of the inhabitants of the south, naturally heated, may not be too much inflamed, their fields and orchards produce cooling fruits, in such plenty, that they are enabled to send ample supplies of them to other countries. In cold climates God compensates for the want of the produce of the earth by the great quantity of fish contained in the sea and lakes, and by the number of animals which live in the forests: and though some of these are a subject of terror to man, they furnish him with the finest furs, wholesome food, and many materials for domestic use. Thus, there is no region in our globe that does not experience the greatness and goodness of the Almighty. There is no country, however barren and poor we may suppose it, where nature is not bountiful enough to provide, not only the necessaries, but the comforts of life.

In every place, O beneficent Father! thy wisdom and goodness may be traced. Even the impassable deserts and the rugged mountains of Asia and Africa contain monuments of thy wisdom and bounty! The frigid as well as the temperate zones send forth hymns of praise to thy divine majesty, and thy sacred name is glorified in all languages. But in our own climate thou shouldest be particularly exalted, since we are more abundantly favored than millions of the other inhabitants of the earth.

## JULY XXII.

### *Singularities of the Sea.*

In general, the sea is considered only as an object of terror, without reflecting on the wonders, and blessings, it so visibly presents to us. It is certainly true, that the sea is a most formidable element when its waves swell mountain high, and the tempest roars. In such cases, vessels are often driven out of their course, overwhelmed by the waves, and swallowed up. Sometimes the storm drives them on banks of sand or rocks, where they are literally dashed to pieces. The whirlpools, or masses of water which make the ship turn rapidly round with their current, and at last swallows it up, are occasioned by great cavities in the sea, where rocks and opposite currents meet. No less dangerous are the waterspouts which the wind raises from the sea towards the sky: they hover in the air, above the ocean,

and the wind whirls them round with violence: they often burst with great noise, and do considerable mischief; for when they approach a ship, they fill the sails, and carry it away; then let it fall again, and dash it to pieces; or precipitate it to the bottom. At least, if they do not carry it away, they break the masts, tear the sails, and sink the vessel.

But we should be very ungrateful to attend only to the mischief the sea occasions, without deigning to reflect on the magnificent works of the Lord, and on his goodness, which shines forth even in the depths of the abyss. The first thing worthy of remark is the *saltness* of the sea, which is such, that a pound of water contains two ounces of salt. The sea-salt appears lighter than what we use in common; and yet it is not drawn into the air, nor does it diminish by the continual influx of sweet water. The cause of this is not known. There may be mountains of salt in the sea; but, if so, the sea would probably be salter in some places than in others, of which we have no certain proof. It is possible that torrents and rivers may carry into the sea salt and nitrous particles; but what would these be in such a vast extent as the ocean? This salt quality, however, be the cause of it what it may, is indispensably necessary for several purposes: it preserves the water from putrefaction, and renders it capable of supporting the heaviest burthens.

The *colour* of the sea also deserves our observation. It is not the same every where. Besides

that, in all water, the colour of the bottom and of the sky appears; that it is black in deep abysses; white and foaming in a storm; silvered and gilded with reflections of the most beautiful hues when the rays of the setting-sun shine upon it; the colour of the sea varies, from the numberless insects, marine plants, and that mixture of substances which the rivers and torrents carry with them into the ocean. When it is calm, it sometimes appears strewed with brilliant stars, and the track of a ship cleaving the waves is often so luminous as to resemble a river of fire. These phenomena must be partly attributed to sulphureous and oily particles and other inflammable substances; and partly to shining insects.

A well known property of the sea is its *flux* and *reflux*. Every day, or rather in the space of twenty-five hours, the sea ebbs and flows twice. When the tide rises, it is called the flux, or flood; when it falls, it is termed the reflux, or ebb. This phenomenon is attended with several remarkable circumstances. There are always a flux and reflux at the same time in two parts of the globe, and those are opposite to each other. When our antipodes have high tides, ours are the same. The tide is always lowest when we are in the first or last quarter of the moon; and our highest tide generally takes place three days after the new or full moon. There may be accidental causes, however, why the tides are higher and lower at one time than another. Though this phenomenon has not hitherto been satisfactorily explained, it is still certain, that great advantages

result to us from it, both in purifying the water, and in favoring the purposes of navigation.

The *creatures* with which the sea abounds are calculated, as well as the preceding phenomena, to excite our surprise and admiration. Here we discover a new world, and the number of beings which inhabit it is prodigious. Aquatic animals are not, indeed, so varied in their species as the terrestrial: but they surpass them in size and longevity. The elephant and ostrich are small in comparison of the whale, which is the largest fish of the ocean, its length being often from 60 to 70 feet: it lives as long as an oak, and consequently no land-animal's life can be compared to it. If we may credit certain accounts, however, the whale itself is surpassed in size by an animal called the *kraken*, which is said to inhabit the northern seas, and to be half a German mile in circumference. But who can even enumerate the different kinds of animated beings which people the surface and bottom of the sea? Who is capable of counting the number, and describing the form, structure, size, and utility of these different animals?

How infinitely great is the Creator of the sea! will be the conclusion of all who seriously investigate this subject. And it is not without the wisest reasons that God has ordained the ocean and seas to occupy two thirds of our globe. The seas were not only to be great reservoirs of water, but also, by means of their evaporation, to become sources of rain, snow, and similar meteors. What wisdom is discoverable in the con-

nexion the seas have with each other, and the continual motion the Creator has impressed upon them! It is no less worthy of observation, that the bottom of the ocean is of the same nature with the surface of the earth. There are found in the sea, rocks, valleys, caverns, plains, springs, rivers, plants, and animals. The islands in the sea, are only the tops of a long chain of mountains. And, when we consider that the sea has been less examined than any other part of the globe, we have reason to believe that it contains many wonders, which neither the senses nor the understanding of man can adequately comprehend, but which all prove the power and wisdom of our God. Let us, therefore, adore Him who has every where, in the ocean as well as upon earth, established monuments of his greatness.

## JULY XXIII.

### *Different Shades observable in Flowers.*

With heart-felt pleasure I cast my eyes around, and every where discover the beauties of the creation. What a lovely assemblage of colours! How pleasing and diversified is their mixture! What wonderful art in the disposition of those shades! Here, a light pencil seems to have laid on the delicate tints; there, they are blended according to the nicest rules of art. The colour of the ground is always such as best throws out the

drawing; whilst the green which surrounds the flower, or the shade which the leaves cast upon it, serves to set off the whole. In thus distributing and diversifying the colours, our gracious God seems to have had no other view than to procure us agreeable sensations.

How great and wisely arranged are all the works of our Creator! We can never sufficiently admire the grandeur of his designs, the magnitude of his views, nor the means he employs in their execution. It is only with labour and application that men accomplish any single work; and after many fruitless efforts, sometimes succeed in *imitating* one of nature's works. But the Supreme Being, in a moment, has given existence to millions of beings, and has created them all in a state of perfection. The more we examine the works of art, the more defective they appear: but though the works of God have been contemplated for thousands of years, a single fault could never be found in the plan, nor can any thing be imagined more perfect than the manner in which they are executed. The more attentively we survey the works of Omnipotence, the more we are astonished at their beauty; and we continually discover new marks of greatness in these masterpieces of a Divine hand.

For my own part, what peculiarly delights me in the shades and colours of flowers, is their simplicity. One would suppose that the Creator must employ an infinite number of materials, to embellish nature in such a manner, and to distribute amongst the flowers and plants so many mag-

nificent, rich, and splendid colours; but God has no occasion for painful exertions to make the creation a scene of wonders: a single element, under his creative hand, assumes the most beautiful forms. The moisture of the earth and air penetrates into the fibres of plants, and filters through a train of transparent stalks. This is what effects all these wonders, and produces all the beauty we behold throughout the vegetable kingdom. This is the sole cause of the beauty, perfume, and growth, of flowers. If each colour had its particular cause, the surprise of the spectator would be diminished; but we contemplate with pleasure, and can never tire of admiring, as the effect of profound wisdom, a work, which, though varied in its parts, is still simple in respect to its cause, and in which we behold a multitude of effects depending on one single spring, which always acts in the same manner.

At this moment while examining the variety of tints which colour the flowers, I feel more than ever the value of the reason with which I am endowed. Without this faculty I should be deprived of the enjoyments I now possess, and flowers would exist in vain for me. But by the assistance of reason, I am capable of discerning the numberless charms of flowers, and the infinite variety of colours and shades which the meadows, valleys, mountains, and forests, present to my view. I am sensible of their beauty, and so appreciate them as to render them conducive to my pleasures. I can do still more: I can, from each flower, raise my thoughts to the Creator,

and find, even in its varied tints, traces of his perfection. How can I sufficiently express my gratitude for the gift of reason, which enables me to enjoy these beauties of nature—these wonderful works of God!

## JULY XXIV.

### *The great Heats of Summer.*

About this time we generally experience the greatest heat; though the sun, having now entered the sign Leo, is daily removing further from us. When we were nearer to this luminary the heat was temperate; but now that we are more remote, it is at its greatest degree of fervency. This phenomenon agrees, however, with the laws of nature; and it is in the plan of our globe that we must seek for the reason of it. The sun was nearer to us lately; but, as its rays were not strong enough to penetrate deep into the earth, we could only perceive a moderate warmth; but, in the space of some weeks, the earth and the bodies upon it are so far heated, that even a less degree of the sun produces more effect than in the beginning of the summer, when it acted upon cold bodies.

This plan of nature displeases many: they complain of that burning heat, which weakens their bodies, and renders them incapable of much labour. But is it not unreasonable to murmur at a plan, which, being founded on the immutable laws of nature, is of course inevitable?

Is it not highly ungrateful to blame that divine government, which, in the end, never fails to promote the welfare of the world? And can any one seriously wish this season less hot? Because the heat is inconvenient, would we wish the fruits, which are to serve for next winter's food, not to ripen? I repeat, that our murmurs are ungrateful to the Creator, who softens and compensates all inconveniences, by certain advantages annexed to them. For example, the inhabitants of the western parts of Africa, and particularly those of Cape Verd, and the island of Goree, are exposed the whole year to the intense heat of the sun; but their bodies are so formed, that their health is not impaired by it; and the winds, which blow continually in those countries, serve to temper and cool the air. And is it probable that the Creator should show less goodness to *us* in this respect? O how unpardonable, if ever we are insensible to the proofs he gives of his kindness, even when the heats are most oppressive! Is it not an effect of his tender mercy, that the summer nights are so well calculated to cool the air? They bring with them a coolness, which prevents the air from dilating, and enables it to act so much the more forcibly on every thing. A single night revives the languishing plants, gives new vigour to enfeebled animals, and so refreshes us, that we forget the weight and fatigue of the day. Even storms, which sometimes excite such terror, are means in the hands of God, of cooling the air, and refreshing the creation. How many fruits, also, are there of a cooling

quality which abate the acrimony of bile—a relief so much the more valuable, as the poorest among us may enjoy it.

Let us cease, then, to complain of the heat of the sun, or the weight of suffering we labour under: both belong to the plan of Divine Wisdom, and both are alleviated by a thousand means, which should call forth our most grateful tribute of adoration.

## JULY XXV.

*Remarkable Properties in Animals.*

Of all parts of nature, the animal kingdom affords the greatest wonders; and, to a lover of natural history, the different instincts and properties of animals afford a most interesting study: but, to a reflecting being, it is something more than merely an agreeable object: the animal operations teach him to trace them back to a wisdom he cannot fathom, because it surpasses all human conception. This is the effect I wish to produce, by pointing out the singularities observable in certain animals.

The manner in which birds and insects lay their eggs is highly worthy of attention. The grasshopper, the lizard, the tortoise, and the crocodile, never trouble themselves about their eggs, nor the young ones that are in them: they lay their eggs in the earth, and leave them to be hatched by the heat of the sun. Other animals by

natural instinct, lay their eggs in places where the young find food the moment they come out of the shell. The mothers are never mistaken. The butterfly proceeding from the cabbage-caterpillar, never lays her eggs on meat; nor will the fly which lives on meat, lay hers on the cabbage. Certain animals are so careful of their eggs, that they carry them with them wherever they go. The spider called the *wanderer*, carries hers in a little silken bag: when they are hatched, they range themselves in a particular order on their mother's back, who goes about with this load, and continues for some time to take care of them. Certain flies lay their eggs on the bodies, or in the nests of living insects. It is well known that there is not a plant which does not serve to feed and lodge many insects. A fly perforates an oak-leaf, and lays an egg in the hole she has made. This wound quickly closes; the place swells up, and an excrescence appears, which is termed a gall. The egg that was contained in the growing gall grows with it, and the insect finds both lodging and food as soon as it comes into existence.

The care which animals take of their young is almost incredible, and their affection so strong that life itself is less dear. With what tenderness do some quadrupeds nourish their young! they cure their wounds by licking them; they convey them from place to place; and when any danger threatens, they keep them close to themselves and defend them. If they are carnivorous, what pains does the mother resolutely take to get them meat! With what art does she instruct them to

catch their prey, to amuse themselves when they have got it, and then to tear it in pieces. It is impossible, without emotion, to read the account of a bitch, which, while they were dissecting her alive, still continued to lick her young ones, as if to seek relief from her sufferings in this maternal care, and cried out lamentably the moment they were taken from her. The sea dog, during a storm, conceals its young under its belly; whence they come out again when the alarm is over.

Each species of animals has its peculiar inclinations and wants. The Creator provides for both. Let us, for example, consider those which are obliged to seek their food in the water, and particularly the aquatic birds. Nature has covered their wings with an oily matter which the water cannot penetrate; by this means they are not wet in diving, which would otherwise render them incapable of flying. The proportions of their bodies are also different from those of other birds. Their legs are placed more behind, that they may stand upright in the water, and extend their wings above it. To enable them to swim, their feet are furnished with webs: for the purpose of diving, they have been given a particular form of body; and for that of seizing their prey, nature has provided them with large bills and long necks. In a word, they are formed exactly in that way which this mode of living requires.

The nautilus is a sort of shell-fish, something resembling a snail. When it wishes to ascend, it

places itself on the fore-part of its shell; and, to make itself lighter, throws out the water through an opening. If it wish to descend, it withdraws into the bottom of its house, which then fills with water, and becomes heavy. If it intend to sail, it artfully turns its shell, which becomes a little gondola, and then it stretches out a thin light membrane, which swells before the wind, and serves as a sail. Perhaps it was from this little nautilus that mankind first learned the art of navigation.

It is with the actions of animals as with their structure. The same wisdom which formed their bodies, and limbs, and appointed them a common use, has also planned the different actions we see them perform, and directs them towards that purpose for which they were created. The brute is guided by the invisible hand of its Creator. It produces works which excite our admiration, and sometimes appears to act from reason. It stops when necessary, plans its work according to circumstances, and yet only follows certain secret springs, which make it move. It is an instrument which cannot judge of what it executes, but is directed by the adorable wisdom of the Creator, who has circumscribed each insect, as well as each planet, within a sphere from which it cannot deviate. When, therefore, I observe the different instincts and industry of animals, I feel a sentiment of veneration, and think I behold a scene where the almighty Author conceals himself behind a curtain: but, whoever reflects seriously on the works of nature, will every

where discover the finger of God; and the examination of the wonderful construction of created beings will fill him with constant gratitude to, and reverence for, the Creator.

## JULY XXVI.

### *The Human Face.*

The exterior of the human body declares the superiority of man over every other living creature. His face, directed towards the heavens, proclaims his dignity, which is so far imprinted on his features, that we may, in some measure, judge from his countenance of the importance of his destination.

When the soul is in a perfect state of tranquillity, the features are calm and composed; but, when agitated and disturbed, the countenance becomes a living picture, in which the passions are depicted with equal force and delicacy. Each affection of the mind has its particular impression, and every change of countenance denotes some secret emotion of the heart. The *eye*, in particular, expresses them so visibly that it is impossible to mistake it. It is more immediately the organ of the mind than any other. The most turbulent passions, and the gentlest affections, are painted with great exactness in this mirror. The eye may therefore be called the true interpreter of the soul, and the organ of the human intellect. The colour of the

eyes, and their motions, contribute much to mark the character of the countenance. Our eyes are proportionably nearer to each other than those of any other living creature. In most animals the space between is so great, that it is impossible for them to see the same object at once with both eyes, unless it be placed at a great distance.

Next to the eyes, the *eye-brows* tend to characterize the countenance. These parts being of a widely different nature from the rest, their particular colour renders them more striking than the other features. The eye-brows are the shade of the picture, which throws out the drawing and colouring. The eye-lashes, when long and thick, contribute much to the beauty of the eye, and give it a more pleasing look. No animals except men and monkeys have both eye-lids ornamented with eye-lashes; other creatures having them only on the lower eye-lid. The eye-brows have but two sorts of motion, which are performed by the assistance of the muscles of the forehead. By means of one they rise, and by means of the other they fall down and draw together.

The *eye-lids* guard the eye, and prevent the cornea from drying. The upper one can of itself rise and fall; the under one has but little motion. Though we can at will move our eye-lids, it is not in our power to keep them open when fatigue and sleep weigh them down.

The *forehead* is a very important part of the face, and adds considerably to its beauty, if it be well-proportioned, neither too full nor too flat, too

large nor too small, and if the hair, growing well, form the outline and ornament of it.

The *nose* is that part of the face which projects most, but is the least movable; and as it is seldom put in motion but in violent passions, it serves rather for the beauty of the whole than for any expression resulting from it. The *mouth* and *lips*, on the contrary, are susceptible of many changes; and, next to the eyes, it is the mouth which best expresses the passions, by the variety of forms it assumes. The tongue also helps to animate and set it in play. The red colour of the lips, and the whiteness of the teeth, add to the charms of the face.

Hitherto we have only examined the human face relatively to the regularity and beauty of its component parts, without discovering their several uses; but under this one point of view we already perceive the infinite wisdom of Him who has throughout all his works, united beauty with utility. While we admire the beauty of the human countenance, our admiration is increased by reflecting on Him whose wisdom and goodness are so conspicuous in this particular; and while contemplating each feature, we are naturally led to meditate on the prerogatives which we enjoy over the animal world, and upon the noble purposes for which we were created. Our features were given for purposes which the brute creation cannot fulfil. Our eyes command the face of nature, and glance, at will, from earth to heaven; our lips chaunt the high praises of our God; and

every feature in the good man's face, displays the integrity of his heart, and the rectitude of his sentiments.

Finally, the ravages which sickness and death make on the human countenance, should prevent us from being proud of our beauty or personal accomplishments; and at the same time they should lead us to reflect on the superlative and immutable felicity which shall follow the resurrection of the just.

## JULY XXVII.

### *The Gravity of Bodies.*

God has endowed bodies with a force which acts at all times, in all places, and in all directions. If a body endeavour to move towards one point more forcibly than to another, it is said to gravitate towards that point; for experience teaches, that bodies are inclined to descend; or that, if they are far from the surface of the earth, without support, they fall on it in a perpendicular line. It is by no means in the body itself that we must seek the cause of its gravity; for a body that falls remains in the state in which it fell, till some exterior cause displace it. It is equally impossible that the air should occasion this gravity; since, being itself heavy, it must resist the velocity of falling bodies. We must, therefore, seek the cause elsewhere. Perhaps

the opinion nearest truth, is that the earth has the power of attracting bodies placed at a certain distance, as the magnet attracts iron; or, it may possibly be imputed to some foreign substance distributed through all bodies.

But, though we cannot positively ascertain the cause of this property, nothing is more evident than the advantages which result from it. Without it we could not possibly move ourselves as we now do. Our centre of gravity is about the middle of our bodies. When we raise the right foot, we make the left to be the centre: if we then bend our body forward, we are near falling; but, by putting out the right foot, we prevent the fall, and make a step. Thus our walking is, in some respects, a continual course of falls; during which the centre of gravity is preserved between our feet. This is the reason we bend forward in going up a hill, and backward in coming down it. We also lean forward when we carry a load on our shoulders, and backward when we carry it before us. All this proceeds from the laws of gravity, which govern the motions of animals, when they walk, swim, or fly.

The same laws regulate the motions of those immense bodies which roll in the firmament: the sun attracts the planets, and each planet in its turn attracts its satellites; or, what is just the same, the planets gravitate towards the sun, and the satellites towards the planets; for a body made to turn round, always flies in a direct line from the centre of its orbit, if it meet with no

obstacle in its way. The planets revolve in their orbits with surprising velocity, without ever deviating from their course; and the moon, though attached by no chain, never flies off from the earth. It seems, then, as if a motion so rapid as that of the moon, would project it far from us in the immeasurable space, if there were not some power which continually impelled it towards our globe, and which counteracted its centrifugal force. That power is the gravitation of the moon towards the earth. If our earth were either lighter or heavier than it is, what would be the consequence? It would either draw too near, or fly too far from the sun. In the first case, the heat would be insupportable; and in the latter, the cold would be equally so; every thing on the surface of the earth would be burnt up, or frozen. What would then become of the seasons, and of a thousand things, which are indispensably necessary to the existence and convenience of mankind?

Here again, then, O Supreme Wisdom! I find a monument of thy wonders. By a cause so small in appearance, thou givest motion to animals, and to the celestial bodies. By the laws of gravity alone, thou preventest the least grain of sand from being lost, upon this or any other globe. But it is in this that the greatness of thy power and wisdom consists, that often the greatest and most astonishing effects are produced by means that appear to us the most insignificant.

## JULY XXVIII.

*Various Effects in Nature proceeding from the same Cause.*

THE whole of nature is an endless chain of causes and effects; and as all parts of the universe are connected together, each motion and each event depends on a preceding cause, and will, in its turn, become a cause of the effects which succeed it. The whole constitution of the world may convince us, that it was not chance, but a Divine wisdom surpassing all conception, which first erected this wonderful fabric, impressed motion upon its different parts, and regulated the great chain of events depending on and succeeding each other. This degree of knowledge is not very difficult to acquire; for though our acquaintance with nature is very limited, we still see numberless important effects derived from causes evident to the human understanding. Many natural phenomena may furnish examples of this.

What a variety of effects are visibly produced by the *heat of the sun!* It not only contributes to preserve the life of multitudes of animals, but also to the vegetation of plants, the ripening of corn and fruit, the fluidity of water, the exhalation of vapours, and the formation of clouds, without which neither rain nor dew could fall upon the earth.

The *air* likewise is so constituted as to fulfil several purposes at once. By means of this ele-

ment, animal bodies are preserved, the lungs are relieved, and all the vital motions acquire energy. It is air which kindles fire, and nourishes the flame. By its motion and undulation, it quickly conveys every sort of sound to the ear: it gives a spring to the winged animals, and enables them to fly from place to place: it opens to man an easy passage through the seas, the vast expanse of which he could not otherwise traverse. It is the air which supports the clouds in the atmosphere, till, becoming too heavy, they fall in rain. By air the morning and evening twilight is formed, which lengthens out the day; and without it, the gift of speech and the sense of hearing would be completely useless. All these, and many other advantages, depend on the air in which we live and breathe. This wonderful element, which surrounds our globe, which is too subtile to be visible to us, and yet so strong that no element can resist its force, is surely a striking proof of the wisdom of our Creator.

The power of *gravitation*, which exists in all bodies, holds the mountains in their places; confines the ocean within its limits, and the earth within her prescribed orbit; supports each created being in its proper place in nature; and preserves the distances which separate the celestial bodies.

Who can enumerate the various uses of *water*? It serves, in general, to dilute, soften, and mix, a great number of substances which we could not otherwise use. It is the most wholesome beverage, and the best nourishment for plants; it turns

mills and several other machines; it procures us fish, and bears on its surface the treasures of distant regions.

How various and innumerable are the effects produced by *fire!* By this element, solid bodies are either melted and made fluid, or become solid bodies of a different nature: it makes fluids boil, or reduces them to a vapour; and gives heat to all other bodies, and sensation of sight to living creatures.

It is not only in the natural world that we see the greatest variety of effects produced by the same cause: in the moral world, also, a single disposition of the mind produces effects no less diversified. Let us, for example, consider the natural inclination we have to love our fellow-creatures. From this are derived the care of parents for their children, social ties, the bonds of friendship, patriotism, goodness in those who govern, and fidelity in those who obey. Thus, a single propensity keeps each individual in the circle prescribed; forms the bond of human society; and is the principle of all virtuous actions, laudable pursuits, and innocent enjoyments. All these are most evident proofs that the world was not made by chance, nor the materials which compose it thrown together, without connexion with each other; but, on the contrary, that it forms a regular whole, which Divine power has ordained with infinite wisdom. In every part, in each phenomenon of the visible world, we discover traces of it. Yet there is much more which escapes the profoundest re-

searches of the greatest capacities; for we cannot trace it in all its different lights.

## JULY XXIX.

### *Some Diseases of Plants.*

VEGETABLES are subject to several diseases. Sometimes they are covered with a whitish matter, which adheres to them like dust. This does not proceed from insects, as is generally supposed, but from a stagnation in the juices, and a beginning of corruption, which attracts insects, and invites them to deposit their eggs upon it. The stagnation of the juices is the first stage of corruption; and it is supposed, that this alone is sufficient to attract insects, because they are seen swarming by millions as soon as the circulation of juices is stopped in a tree, either by natural or artificial causes. Hence it is that the weakest and worst situated trees are most frequently subject to this malady. If insects were really the cause of it, it could not be produced by art; whereas, if a tree be purposely wounded, or deprived of the care it requires, it will immediately become mildewed. On a tree, thus weakened, millions of insects settle at once, while the neighbouring trees are free from them. This corruption, therefore, should no more be attributed to insects than that of animal substances. On the contrary, it is evidently occasioned by

the stagnation of the juices, which may be occasioned by many circumstances.

A matter resembling dew, but which is glutinous, sweet, and corrosive, frequently scorches and destroys plants. It was formerly imagined that insects conveyed this glutinous juice into vegetables, or that bees carried their honey thither; but repeated observations have demonstrated that this matter falls from the air in the form of dew. In some countries it lies in little drops on a number of vegetables of different kinds; and, in the space of a night, it covers almost all the leaves of a long row of trees, on which none had been perceived before. Perhaps this dew may be formed from the exhalations of flowers, and blossoms of trees, out of which the bees extract their honey; and, if more be deposited in one place than another, it is owing to the direction of the wind. Perhaps, also, this matter may be the effect of some disease in the plants, when the juices are vitiated, which may attract insects, like the mildew before mentioned; for the leaves, branches, bushes, and weak trees, are most subject to this malady. It has also been remarked, that the leaves on which this species of dew falls, become spotted and black; and it is highly probable that this substance is the cause of it.

Here we discover fresh traces of Divine wisdom; for, as the insects require food to live upon, it is for our benefit they should be obliged to seek it in those vegetables which, being already spoiled, are become useless to us. It is owing to

this wise arrangement, that these animals deprive us of nothing that is necessary for our support; but merely attach themselves to that which would be injurious to us. It is true, that, according to the course of nature, each plant, each tree, and even each animal, serves to support some living creatures. We revenge ourselves on the species which hurt us, and seek as much as possible to destroy them: perhaps, however, we should be more disposed to spare them, if we considered how little real harm we suffer from their depredations.

## JULY XXX.

### *Means of Subsistence which Nature affords to Animals.*

It is one of the great effects of Divine goodness and power, that there is every where provided a sufficiency of food to support all the living creatures with which the world is filled. It is not, indeed, wonderful, that the countries which lie within the temperate zones should furnish subsistence for their inhabitants; but that it should be the same every where else, even where we could least expect to find food and pasture, and that such different kinds of animals should never fail of provisions, can only be attributed to the care of a wise and beneficent Providence.

God has proportioned the supply of food to the number and wants of the animals which are

to consume it. In most places there is a superabundance; but this profusion is not so great as to cause the alimentary matter to corrupt and decay: for this would be highly prejudicial. It is peculiarly worthy of remark, that, among so many sorts of food, the most useful and necessary are, in general, the most common, and such as are most easily multiplied. As there are a great number of animals which subsist upon grass and herbs, the meadows abound with these, and wholesome plants, which grow spontaneously, and resist the inclemency of the air. Is it not worthy our attention, that corn, the principal food of man, can be so easily cultivated, and so astonishingly multiplied? For example, a bushel of wheat, if sown in a good soil, may produce a hundred and fifty bushels.

Is it not a very wise arrangement of the Creator, that the taste of animals should be so different? that some love to feed on herbs, some on corn, others on meat, worms, insects, &c.? Some are content with a little, others are almost insatiable. If all sorts of animals had an inclination for the same kind of food, the earth would soon become incapable of supplying their wants. The diversity of taste, then, which we perceive among them, demonstrates that it is not by accident that they prefer this or that particular aliment; but that it is owing to a natural instinct, which leads them to food best adapted to the nature of their bodies. By this means, all the productions of the earth and sea are properly distributed. Not only every thing that breathes is

amply provided for, but even those substances which, by corrupting, might prove a nuisance, have their particular uses: for the most wholesome plants would perish, and the carcases of fish, birds, and beasts, would exhale a destructive poison, were it not for the wise direction of the Creator, who ordained that different animals should choose these things for their food.

Food offers itself spontaneously to most animals; but they require art to discern it, and must be prudent and cautious in their choice. Their provisions are so prepared, that what is useful to one species is hurtful to another, and turns to poison. From the repeated observations and experiments of botanists, it appears, that oxen eat of two hundred and seventy-six species of grass, and reject two hundred and eighteen; that goats eat of four hundred and forty-nine, and leave a hundred and twenty-six untouched; that sheep feed on three hundred and eighty-seven, and reject a hundred and forty-one; that the horse grazes on two hundred and sixty-two, and refuses two hundred and twelve; and that swine are contented with seventy-two, but there are a hundred and seventy-one which they will not eat.

Some animals are obliged to seek their food with labour, and afar off; to dig for it in the earth, or to collect it from a thousand places where it is scattered about, or even to bring it out of another element. Many are obliged to choose the most favourable time of night to satisfy their hunger in safety; others have to prepare their food, pick the seeds out of their husks, bruise

those which are hard, swallow little stones to assist digestion, take off the heads of the insects they feed on, break the bones of the prey they have taken, and turn the fish which they have seized in order to swallow them by the head. Many would perish were they not to collect in their nests provisions against a future time of need. Others could never catch their prey without laying snares, or digging holes for them. Some pursue their prey on land; others in the air, or under the water.

The more the food of animals, and their manner of procuring it, are diversified, the more we should admire the wisdom and goodness of God displayed in their preservation.

## JULY XXXI.

### *Variety in the Stature of Man.*

THE height of the human body varies considerably; but the usual stature is from five to six feet. The inhabitants of the northern countries bordering on the Icy sea are not five feet in height. The least people yet known, inhabit the mountains in the interior of the island of Madagascar; being scarcely four feet high. Many of these diminutive people derive their origin from nations of the ordinary stature; and the cause of their degeneracy must certainly be imputed to the nature of the climate they inhabit. The excessive cold which prevails there during the

greatest part of the year, causes the vegetables and animals to be smaller than in other climates; and why may not man be affected by the same circumstances?

On the other hand, there are whole nations of a gigantic size. The most famous of these are the Patagonians, who live near the Straits of Magellan: it is asserted, that they are from eight to ten feet high. Neither ought it to appear to us impossible that there should be people taller than the Europeans: besides the traces that remain of this in history, and in the monuments of antiquity, there have sometimes been seen, even in our own climates, men above six feet and a half high; who were, notwithstanding, well proportioned, healthy, and capable of all the exercises and labours which require strength and activity.

Adorable Creator! thy wisdom is evident in these varieties of human nature. All that thou hast made in the animal, vegetable, and mineral kingdoms, has been by weight, number, and measure. Every thing bears thy impression: the dwarf, as well as the giant; the blade of grass, as well as the oak; the worm, as well as the elephant.

## AUGUST I.

### *Meditation on the Works of Nature.*

FATHER of the Universe! Creator and Preserver of all that breathe! how great is thy majesty, and

how immense are the wonders thou showest unto man! Thy hand has stretched out the heavens, and strewed them with stars.

To-day I behold the sun rising in peerless splendor, to re-animate the face of nature. To-morrow, my eyes may be closed to this cheerful scene, and my ears be no more regaled with those melodious warblings which now resound through meadows, woods, and valleys. I feel that I am mortal: my life fades away like the grass of the field, and withers as a leaf fallen from the branch where it grew. Who knows when these words of the Almighty will be heard by me, 'Man, return to dust!'

When my body shall be deposited in the grave, encompassed by thick darkness, and a prey to devouring worms, what will remain of my earthly possessions? Will not all be lost to me, though even all my wishes had been gratified, and I had here enjoyed unmixed happiness?

Oh, how senseless should I be, were I to attach myself to the transitory blessings of this world! were I to aspire after great riches, or be ambitious of empty honours; or if, permitting myself to be dazzled by vain splendor, envy and pride should take possession of my heart. If, too eager in my wishes, I have pursued the phantom of wealth or pleasure beyond the limits of moderation, I humble myself before thee, O God! and submit to whatever chastisement thy wisdom shall direct.

Man, blinded by pride and presumption, prescribes laws to his Creator! he dares to arraign

the decrees of Eternal Wisdom! And thou, Almighty Friend of man, thou lovest him more than he loves himself, when thy goodness withholds those deceitful enjoyments which are the objects of his wishes.

When, in the morning, on the green turf spangled with dew, every thing presents itself in a pleasing form, and the wings of the night have cooled the sultry air, wisdom cries out to me, O mortal! why dost thou abandon thyself to wretchedness, or torment thyself with anxious cares about the future? Is not God thy father? Art not thou his child? Will not he who made thee, take care of his own work? The plan of thy existence is not limited to this earth: it extends to heaven. Life is but a moment; and the longest earthly felicity is but a pleasing dream. O man! God has made thee immortal. The thought of immortality tends to raise us above the earth, the universe, and time. May it awaken my heart, when, seduced by false pleasures, I am inclined to quit the path of virtue!

The roses which crown the head of the wicked, soon fade: his shameful enjoyments are mingled with dishonour and succeeded by bitter repentance. I am but a sojourner upon earth; and none but immortal joys deserve my pursuit.

O thou indulgent God, who delightest in dispensing blessings, condescend to give me a heart modelled by thine own will, and replete with every true virtue. While others eagerly covet the honours and pleasures of the world, I meekly implore that grace which shall render me contented

with my situation, faithful in the discharge of moral and religious duties, and deserving the name of a wise man and a Christian.

## AUGUST II.

### *Vegetation of the Stalk of Wheat.*

THE stalk of wheat is composed of the principal stem, of the small ones growing out of the sides, and of others which afterwards spring out of these. It begins to form as soon as four green leaves make their appearance. If the plant be then taken, and the under leaf be cautiously pressed, or separated, a little white point will appear, which gradually grows into a stalk; and, under the first leaf, is the little root. The white point springs out of the substance of a knob, opens into green leaves, and produces a new point at the side. But these several points, and the stalks they produce, are not all designed to bear fruit: many of them wither, and fall off. When the principal stem has acquired some growth, a considerable revolution takes place in the plant, and all the sap is then employed in the formation of the blossoms and fruit. But, before that, when the plant begins to vegetate, four or six leaves are seen to form and spring from as many knobs. These prepare the nutritive juice for the ear, which is seen in miniature, in spring, upon opening a stalk through the middle. Even in autumn, this ear may be seen, in the form of a

little cluster, when the knobs are still very closely united. When the plant begins to bud, the two upper leaves of the stalk join together, enclose the ear, and protect it, till it has acquired some degree of consistency. Before that happens, all the knobs, and particularly the two last, though soft, are closely connected, leaving very little space between them; but as soon as the ear has pierced through its coverings, all its parts lengthen, and the leaves give them all the juices they contain. The knobs harden by degrees, the under leaves dry up, and the juices which nourished them are then only employed in strengthening the stem.

After all these preparations, the blossom appears. This is a little white stalk, extremely slender, which comes from the bag of the grain. Several other little stalks surround it: they are at first yellowish, then brown, and, a little before they fade and fall off, become black. The chief use of these stalks is to nourish a little cluster in the bag of seeds. As soon as the corn has done blossoming, we see grains, which contain the germ, and which come to perfection long before the farinaceous substance appears. This matter gradually increases, while the sap collects round an extremely fine and delicate part resembling down. This substance, which exists longer than the blossoms, serves, among other things, to hold together the opening of the principal tube that passes through the corn. The fruit begins to ripen as soon as it has attained its full growth; then the stalk and the ear whiten, and the green

colour of the grain changes into yellow, or dark brown. These grains are still, however, very soft, and their mealy part contains much moisture; but when the wheat is quite ripe, it becomes dry and hard.

We cannot sufficiently admire the wisdom manifested in the formation and growth of corn; which those who are accustomed to reflection may discover in the smallest stalk. Even the leaves which surround it, before it has attained its full growth, have their use: and it seems as if the Creator had placed them round the stalk for the same reason that an architect raises a scaffolding about a building, which, when the edifice is finished, he takes away; for, as soon as the blade has attained its full length and consistency, the leaves which protected it dry up and fall off. Whole months pass away before the ear of corn ventures to expose itself to the air; but as soon as every thing is prepared for the formation of the blossoms and fruit, they appear in a few days. With what skill, also, are the stalks and ears constructed! If the former were higher, the nutritive juice could not so well penetrate into them; if, on the contrary, the grain had been placed lower, birds and other animals would get at and destroy it. If the stem were weaker and smaller, the wind would break it; and if it were stronger and thicker, little animals might lodge in it, and the birds perch upon it, and pick out the grain.

Merciful and beneficent Father! may all those who behold a field of wheat, and contemplate,

the waving corn, experience all the sentiments of love and admiration which thy goodness ought naturally to excite.

## AUGUST III.

### *The Dog-days.*

THE sun, besides the diurnal motion, which appears to convey him from east to west, and which occasions the revolution of day and night, seems to have another motion from west to east; by means of which, at the end of 365 days, he comes again near the same stars from which he was removing for six months, and to which he was approaching the other six month. On this account the ancient astronomers divided the seasons according to the stars which the sun meets in his annual course. This course they divided into twelve constellations, which are the twelve signs of the zodiac, called the twelve houses of the sun, because he seems to dwell a month in each of them.

The summer begins with us when the sun enters the sign cancer, which happens on the 21st or 22nd of June. It is then that he attains his highest degree of elevation above the horizon, and that his rays fall almost directly upon us; and it is at this time that the summer heat begins, which always increases in the following month, in proportion as our globe is more heated by the rays of the sun. Hence it happens

that the month of July and part of August are gene rally the hottest part of the year; and experience has proved, that, from the 20th of July to the 10th of August, the heat is at its greatest height. Now, of all the stars in conjunction with the sun, the dog-star is the most brilliant. Lost in the rays of the sun, it disappears from us for a month, as is the case with every star which the sun meets in its course; and the month of its disappearing is the time called the *dog-days*.

These observations would be of little importance if they did not serve to combat a prejudice deeply rooted in the minds of many people. An old tradition attributes the heat usually felt at this time, to the influence of the dog-star upon the earth and its inhabitants. But the absurdity of this opinion will appear, when we reflect that the occultation of the dog-star in the sun's rays, does not take place in the time we call dog-days. Those days, properly speaking, do not begin till the end of August, and do not end till about the 20th of September. And as the dog-star, or *Sirius*, always advances farther, it will attain, in time, to the months of October and November; and at last it will be found to fall in the month of January, when we shall, in the dog-days, experience severe cold. These observations plainly prove, that it is impossible this star should occasion the great heats which we suffer, or the effects they produce.—When, therefore, in the supposed dog-days, wine or beer spoils in bad cellars; when things liable to ferment turn sour; when ponds dry up, and fountains cease to flow; when dogs

and other animals are seized with madness; and men are afflicted with various maladies; it is not because a star is concealed behind the sun, but from the excessive heat of the weather, occasioned by another cause.

Whoever can suppose, that certain figures, which the imagination forms to itself in the sky, can have any influence on our globe, and on the health and reason of man, discovers great want of judgement. It is not the stars, but generally ourselves, that we ought to accuse of the evils we suffer. If, therefore, dangerous maladies prevail at this season, let us not impute them to the influence of the dog-star, which is entirely chimerical: let us rather believe they proceed from our misconduct and neglect. If we consider the point seriously, we sin against a wise Providence, by indulging such prejudices. Can we suppose an infinitely good Being, the Ruler of the world, to have created any thing in the heavens or in the earth to be a torment and misery to his creatures? Instead of being guilty of such an error, let us glorify God, and secure our own tranquillity, by believing ourselves to be under the protection of a merciful Father, without whose permission not a hair of our heads can perish.

## AUGUST IV.

### *Sleep.*

We fall asleep with more or less rapidity according to our constitution and state of health. But whether sleep overtake us slowly or suddenly, it always comes in the same manner, and the preceding circumstances are exactly similar in all men.

The first thing which happens when we are falling asleep, is a stupefaction of the senses, which, no longer receiving exterior impressions, slacken, and gradually become inactive. Hence it follows that the attention fails and is lost; the memory is confused; the passions become calm; and the train of thought and reasoning becomes deranged. When we perceive sleep coming, it is but the first step to it; we are not then sleeping, but dozing. When quite asleep, we have no longer that consciousness, that fixed idea of ourselves, which depends on the exercise of memory. To the stupefaction of the senses is soon added a stiffness of the muscles. This is the second degree towards sleep. This state produces several symptoms in the machine, which may be observed in those who sleep in a chair: the eye-lids wink, open and shut of themselves, and at last fall down; the head totters, and falls forward: we endeavour to support it, but it falls still lower down, and we have no longer strength to raise it up; the chin then rests on the bosom, and we sleep quietly in this attitude. If our sleep be

sound, all voluntary functions are suspended, but the natural or vital functions are performed with the more force. This is the third change which sleep occasions in us.

Digestion, or the preparation of humours by the chyle, is better performed when we sleep. When we are awake, the natural motions are sometimes disturbed by those which are voluntary, and the motion of the fluids is accelerated in some vessels, and retarded in others. The blood is wasted in external actions, and, consequently, does not flow through the internal parts so abundantly. The circulation of the blood is very strong in those parts of our bodies which are in motion; and it is continually pressing the humours in the secretory vessels; whilst, on the contrary, it is so weak in the others, that the chyle can scarcely turn into blood. A sweet sleep restores the equilibrium every where: the vessels are equally open; the juices flow uniformly; the warmth is preserved in the same degree: in a word, nothing is lost, but all contributes to the good of the machine. Hence it is, that, after a sound sleep, we feel rested, refreshed, strong, and vigorous. Are not these reflections calculated to make us sensible of the goodness of our Heavenly Father? What preparatives, what tender care, to procure us the blessings of sleep! It particularly deserves our grateful attention, that sleep is attended with an entire stupefaction of the senses, and seizes us unawares and irresistibly. The first of these circumstances makes sleep more sound and refreshing; the second makes

it an inevitable necessity. And how admirably is the wisdom of Providence displayed in the regulation of the muscles during sleep! The first which grows stiff is intended to guard one of our most precious organs, and that which is most exposed to danger, the eye. As soon as we grow sleepy, the eye-lid closes of itself, and protects the eye till we awaken. In other parts of the body the muscles contract with more force, because their being relaxed might be dangerous and inconvenient.

Let, then, the hours in which we are disposed to enjoy the sweets of sleep, be preceded by gratitude and thanksgiving towards our Heavenly Father. Let us bless him, not only for the days happily succeeding one another, but for having so formed us, that sleep refreshes and recruits our strength. Let us fall asleep with these thoughts, and let them be the first that occupy our minds when we awake.

## AUGUST V.

### *Divisibility of Matter.*

We may easily be convinced of the infinite divisibility of bodies, by the different perfumes which plants and flowers exhale. How inconceivably small must the fragrant corpuscles of a carnation be, which diffuse themselves over a whole garden! If this be not a sufficient instance, let us consider other objects in nature; let us cast our eyes on a

silk thread, the work of a poor worm. Supposing this thread to be three hundred and sixty feet long, it will weigh but a single grain. Consider again into how many perceptible parts a length of three hundred and sixty feet may be divided. A single inch may be divided into six hundred equal parts, each as thick as a hair, and therefore perfectly visible. Consequently a grain of silk may be divided into, at least, two millions five hundred and ninety-two thousand parts, each of which may be seen without a microscope. And as those same parts may still be divided into several more millions of parts, till the division be continued beyond the reach of thought, it is evident that this progression may extend to infinity. The last particles, which cannot be separated by human industry, must still, however, have extent, and, consequently, are capable of division, although we are no longer able to effect it.

If we examine the animal creation, we shall discover fresh proofs of the infinite divisibility of matter. A great naturalist put pepper into a glass of water, and, by means of a microscope, he discovered in that water a multitude of animalculæ, a thousand million of times smaller than a grain of sand. How inconceivably small, then, must the feet, the organs of sense, the muscles, the veins, and nerves, of such animalculæ be! What must their eggs and their young be! How small the limbs of the young ones, their vessels, and the juices which circulate in them! Here imagination is lost, and our ideas are confounded.

It is particularly worthy observation, that the more we magnify, by the assistance of glasses, the works of nature, the more regular and beautiful they appear; while it is quite different in respect to those of art: for, when these are examined through a microscope, we are astonished to find them so coarse, rough, and imperfect, though they have been executed with all imaginable care by the most eminent workmen. Thus God has impressed, even on the smallest atom, an image of his own infinity. The most subtile body is a sort of a world, in which millions of parts are found united, and arranged in the most perfect order. How astonishing is that wisdom which, in the little as well as the great, can operate with so much regularity and perfection! How great that power which could draw out of nothing such an infinite multitude of all sorts of beings!

O God! how forcibly ought these reflections to make us feel the limits of our understanding! The least worm, the smallest insect, the least grain of dust, may convince us, that there are millions of things of which we are ignorant, and which we cannot explain. Try, O man! to enumerate the component parts of the body of an animalcule, which is a million of times smaller than a grain of sand. Undertake to decide the degree of subtilty of one of those rays of light, several millions of which can pass through an aperture no larger than the eye of a needle. Thou wilt soon find thy ideas confounded, and be obliged to confess thy ignorance, and the limited state of thy un-

derstanding. How then canst thou be proud of thy knowledge? and how canst thou presumptuously arraign the ways of the Most High, and condemn the arrangements of his infinite wisdom? Rather consider it a duty and a privilege to acknowledge thy ignorance, and the matchless grandeur of thy Creator.

Such is the use we should make of these meditations. Let us reflect on the infinite divisibility of bodies, only to feel the more forcibly the greatness of God, and our own littleness. This will give us reason to admire the wisdom of the Creator; for, by means of the infinite minuteness of the particles of matter, all voids are filled up, without the least interruption of motion, and the universe presents a scene continually diversified.

## AUGUST VI.

### *Outward Construction of the Limbs of Insects.*

In general, we judge no animals worth our attention, but those which are distinguished by their bulk. The horse, the bull, the elephant, and other large animals seem to merit our notice, whilst we scarcely deign to look at those innumerable multitudes of small creatures which occupy the air, the vegetables, and the dust. How many insects do we tread under our feet! How many caterpillars do we destroy! And how many flies buzz around us without exciting our curiosity, or any other thought than how to deprive

them of existence! Nothing, however, is more unreasonable than such inattention; for it is certain, that the wisdom and power of our Creator are no less conspicuous in the structure of a worm, or a snail, than in that of an elephant, a horse, or a lion.

The bodies of most insects are composed of several rings, which link one within another, and have a part in all the motions of the animal. The essential character which distinguishes insects, is, that, properly speaking, they have no bones. And in this circumstance of their formation much wisdom is manifested. The motions adapted to insects, the manner in which they are obliged to seek their food, and particularly the transformations they undergo, could not be so easily performed, if, instead of these flexible rings which recede from, or approach, each other at the will of the animal, their bodies were connected and strengthened by bones.

It is observable in several insects, that they have the power of contracting or enlarging their heads at pleasure; that they can lengthen or shorten them, conceal them, or cause them to appear, as their inclinations or necessities may require. But there are others whose heads always retain the same form. The mouth of insects is generally provided with a sort of teeth or a trunk. This is necessary, both on account of their food, and the different dangers to which they are exposed. Insects have two sorts of eyes: those which are bright and smooth are generally few in number; but those eyes which resemble net-work or sha-

green, and of which the cornea is cut in angles, are extremely numerous: there are sometimes thousands of them, and as they are not movable, this defect is supplied by their number and position. Many insects have not the faculty of vision; but they are compensated for this, by their more exquisite feeling, or some other sense.

The antennæ or horns, which most insects are furnished with, are of particular use to them: these horns, being extended before the body when it moves, and feeling out the way, not only warn the animal of the dangers with which it is threatened, but also enable it to discover its proper food. The legs of insects are either scaly or membranous: the former move by means of several joints; and the latter, which are softer, move in all directions. Sometimes both these kinds of legs are found in the same animal. There are insects which have several hundreds of feet; but these do not travel so fast as those which have only four. With respect to this part of their structure, there is infinite variety among insects. With what art must the limbs of those be constructed which fasten on smooth and polished surfaces! How elastic the legs of those which leap! How strong must those be which dig in the ground! Two or four wings are placed in the middle of the body. Some are as transparent as fine gauze; others are scaly and mealy; some are without covering, others are concealed in cases or shells. At the sides, or at the extremity of the body, there are orifices something like the

pupil of the eye; they are called stigmata, and are the organs of respiration.

The variety observable in the construction and form of the limbs of insects is prodigious; and the lives of many men would not suffice to observe and describe the different figures of these little animals. How varied are the forms of insects which walk, fly, leap, or crawl? And yet, they are always in the same harmony and perfect proportion. Would it not be the height of extravagance and perverseness not to acknowledge, in all this, the infinite wisdom of the Creator? We are only rational and virtuous in proportion as we acknowledge God, and adore him in all things. Let us henceforth acquit ourselves of these duties. If we see but an insect, let us study as much as possible its wonderful construction, that we may have a more lively sense of the greatness of God.

## AUGUST VII.

*Comparison between the Senses of Men and those of Animals.*

Are there any animals whose senses are more perfect than those of man? It is only in particular cases that this question can be answered in the affirmative: for it may be said of man, that, in this respect also, he is, in general, more highly favoured than the brute creation. It is,

indeed, asserted, that the spider has a finer feeling; and that the vulture, the bee, and the dog, have a much keener smell: it is known, that, by means of this sense, the hound follows the track of the game, and that other dogs are taught to find truffles under ground: the hog also, guided by scent, digs in the earth for his food. Stags are supposed to have so quick a hearing, that they can discern the sound of bells at the distance of several miles; and the mole hears better, under ground, than man, who inhabits the surface, and lives in open air. It may be added, that, in regard to sight, the eagle and the lynx have greatly the advantage of man.

These remarks are certainly true; but if we consider animals in general, and compare them with man, we must be forcibly struck with his pre-eminence in the scale of creation. Man is naturally endowed with five senses; and this advantage is not given to half the animals. The zoophytes, which form the connecting link between the animal and the vegetable kingdoms, have only the sense of feeling. Many animals have but two senses; others have three; and those which have five are reckoned among the most perfect class. But even these have very seldom all their senses more perfect than men, some of whom enjoy them in a very high degree. Some Indians judge, by their smell, how much alloy is mixed in precious metals, as well as we can by applying the touchstone to them; others we are told, can discover, at a great distance, the retreats of wild beasts. And the inhabitants of

the Antilles can distinguish, by the smell, whether a Frenchman or a Negro has last passed along the road. Savages are, in some measure, compensated for the weakness of their intellectual faculties by the quickness of their senses. Many people have exercised and improved certain senses to an astonishing degree; and if mankind were, like the animals, without other assistance besides their senses, to procure food, and to guard them against dangers; if reason were not their surer and better guide, their senses, without doubt, would have acquired the highest degree of perfection, by exercising them to advantage. But, in reality, man does not require senses more exquisite than he possesses: reason compensates a hundred-fold for some privileges which certain animals appear to have over him. We may even be assured, that, if our senses were more exquisite, we should experience great inconvenience from them. Let us, for example, consider hearing. If we had this sense so acute as the safety of animals requires it to be in them, even the most distant noise, and the stunning din of mixed sounds, would continually interrupt our meditations, our repose, and our noblest employments.

Thanks to the infinite wisdom of the Creator, which has so arranged the degree of our sensations, that they enable us fully to enjoy the blessings of nature, without disturbing the noblest occupations of human reason. The limited state of our senses is an advantage rather than a loss to us, a perfection rather than an imperfection. Happy the man who allows his reason to govern

his senses, and who enjoys all the advantages which must result from a perfect harmony between both!

## AUGUST VIII.

### *Thunder.*

The thunder roars! O mortal man! who is it that causes this terrible noise? Who is it that darts the lightning from the clouds? Behold, O sinner! it is the Ruler of the world; it is the hand of the Most High which hurls the thunder-bolt. Nature reposes in his hands: he preserves and blesses it: but at his almighty word the heavens and the earth are consumed by flames.

The thunder roars! How dreadful is the stormy sky! The lightning flashes! The thunder-bolt is shot! O God! how great art thou, and how terrible is thy power! The Lord, from the height of his throne, darts angry looks upon us; and, by the glare of his lightning, we see the grave open under our feet.

When the Lord sits upon the clouds, men and heroes tremble; when he sharpens the sword of his anger, the universe turns pale. God directs the thunder; the sinner hears and shudders; scarcely daring to raise his eyes towards Him, whose voice seems to threaten him with destruction!

Christian, let not the majesty of thy God affright *thy* soul, even when he sits in the stormy

clouds, and darts his lightning! When the pealing thunder terrifies the wicked, thy God watches over *thee*, and guards thee from every danger. And though he should deprive thee of life, all his judgements are just: he is thy master, and thou wilt say unto him, Lord! my soul is at peace; whether I live or die, all my hope is in thee.

He who, when the sky is serene, glorifies his God in songs of joy and gratitude, is calm and undaunted, while the rebellious sinner flees from the gathering storm. But whither can the sinner flee? Can he escape from the Most High? In vain does he attempt to hide himself! the lightning pursues, and smites him in his dark retreat. O ye wicked! think not of escaping, nor imagine that flight will save you; since it is impossible to conceal yourselves from an omnipresent God. While the thunder roars, you tremble and are dismayed; but when the storm subsides, you return to the deceitful pleasures of iniquity. If you would obtain mercy, adore the forbearance of Divine Justice; fulfil the vows which you uttered in the hour of distress; and remember that God will not be mocked. God is merciful, and spares the rebellious; but he does not spare for ever: he is also just, and the Supreme Judge will call the sinner to account. What is the thunder roaring over our heads, in comparison of that solemn day, when we shall hear the sound of a storm in which the elements themselves will be dissolved!

## AUGUST IX.

### *Contemplation on a Meadow.*

Ye dark and majestic woods, where the fir-tree rears its stately head, and the tufted oaks spread their luxuriant foliage! ye rivers, which roll your silver streams among the grey mountains! it is not you I now design to praise: the verdure and enamel of the fields are the objects of my present meditation.

How many beauties present themselves to the sight, and how varied are they! Thousands of vegetables, and millions of living creatures! Some flutter from flower to flower, while others creep through the dark labyrinths of the tufted grass! All these insects, so infinitely varied in form and beauty, here find food and happiness; all inhabit this earth, as we do: and, however contemptible they may appear, all are perfect in their kind.

How soft the murmur of that limpid stream, as it gently laves the flowers, which, bending over the grassy bank, frequently kiss the dimpling wave, or dance reflected in its surface! Behold that immense profusion of waving herbs! What a mild lustre the sun casts on those different shades of green! Some delicate plants interweave themselves with the grass, and thus mix their tender foliage; others proudly rear their heads above their companions, and display flowers without perfume; whilst the humble unassuming violet peeps forth beneath the banks, and impreg-

nates the air with fragrant odours. Thus we often see the virtuous but indigent man diffuse happiness around his little sphere; whilst the sons of vice, clothed in superb attire, consume the blessings of the earth in idleness or dissipation.

Winged insects pursue each other in the grass. Sometimes I lose sight of them in the verdure, and then again I see a swarm of them suddenly rising in the air, and sporting in the rays of the sun.

What is that gaudy flower, waving near the brook? How lively its colours! how beautiful! I draw near, and smile at my mistake: a *butterfly* flies off, and leaves the blade of grass which bent under its weight. In another place I perceive an insect clothed in a black cuirass, and adorned with brilliant wings. It comes buzzing to rest upon a blue bell, perhaps by the side of its companion.

What other buzzing is this I hear? Why do those flowers bend their heads? It is a swarm of young bees. They have lightly flown from their distant habitation, and dispersed themselves over the gardens and fields. Now they are collecting sweet nectar from the flowers, in order to carry it to their cells. There is not an idler amongst them. They fly from flower to flower; and, in seeking their stores, they conceal their velvet heads in the cups of the flowers, or penetrate with labour into those that are not yet unfolded.

There, on a high stalk of clover, is perched a butterfly. She shakes her gaudy wings, settles the shining feathers which adorn her head, and seems proud of her charms. Beautiful butterfly!

make that flower bend, which serves thee for a throne, and contemplate thy rich dress in the mirror of the water: then wilt thou resemble a young beauty, admiring herself in the glass which reflects her charms: her garments are less beautiful than thy wings, and her thoughts are as light as thine!

Behold this little worm playing on the grass! No researches of luxury, no human art, can imitate the green and gold which cover its wings.

O how beautiful is nature! The grass and flowers grow in rich profusion; the trees are covered with foliage; the gentle breeze salutes us; the herds seek their pasture; and the bleating lambs skip and rejoice in their existence! Thousands of green blades rise up in this meadow, and every blade is spangled with a drop of dew. The leaves of the primrose are agitated by the passing zephyr, and the melody of the nightingale is heard among the adjacent hills. Every thing expresses and inspires joy. It reigns in the hills and dales, in woods and thickets. Nature is beautiful even in her least productions! and whoever can be insensible to her charms, becomes a prey to tumultuous desires, pursues false blessings, and deprives himself of the purest pleasures. Happy he whose innocent life passes away in the enjoyment of the beauties of nature! The whole creation smiles upon him, and joy attends him wherever he goes, and under whatever shade he reposes. Pleasure springs out of every source, exhales from each flower, and resounds in every grove. Happy he who takes pleasure in

innocent delights! His mind is serene as a calm summer-day; his affections are gentle, and pure as the perfume of the flowers around him. Happy he, who, in the beauties of nature, traces his God and devotes himself entirely to the service of the Most High.

## AUGUST X.

### *Mischief occasioned by Animals.*

It is often distressing to see some of the finest and most beautiful productions of nature exposed to the ravages of animals. Every summer we witness great depredations on the vegetable kingdom, occasioned by the rapacity of different kinds of birds, insects, and reptiles. How many trees are destroyed, and fruits consumed, by worms and caterpillars! How many things necessary for our subsistence are we deprived of by the insatiable sparrow, and the no less voracious raven! How sad is it to see a whole field destroyed by rats or locusts!

These and similar complaints are frequently made by persons who seem to imagine that certain animals exist only to torment mankind. It is true, there is some foundation for such complaints; and it cannot be denied that some creatures occasion much mischief. It is easier to exterminate wolves, lions, and other wild beasts, than to extirpate insects when they swarm over a whole country. In Peru, a sort of ant called

*chako* is a real plague to the inhabitants. Their lives would even be in danger, if they did not use precautions to deliver themselves from these dreadful insects. It is well known what devastation caterpillars make on our fruit-trees, and mice on our fields. But, however great these inconveniences may be, they do not authorize such bitter complaints as some people make—complaints in which self-love has too great a part. We are pleased at observing that the creatures hurtful to us destroy one another; and we think we have a right to take away the lives of animals, either for our food, or for any other purpose; but we cannot bear that they should take any thing from us. We expect they should serve for our subsistence, and yet will give up nothing to them. In reality, however, have we any more right over the life of a gnat, than it has to a drop of our blood? Besides, in complaining of the voracity of animals, we do not consider that this arrangement of nature is not so disadvantageous as it appears. To be convinced of this, we have only to consider the animal kingdom collectively. We shall then perceive, that many species apparently noxious, are, in reality, of great utility; and that it would be dangerous to endeavour to destroy them.

Several years ago, some inhabitants of the *then* English colonies of America endeavoured to extirpate the tribe of jays, because they imagined that these birds did much mischief to the corn; but, in proportion as the number of jays diminished, the people were struck with the havoc

made by an enormous multitude of worms, caterpillars, and particularly May-bugs. This checked the persecution against the jays; and, as soon as these multiplied again, they put an end to the plague, which had been a consequence of their destruction.

Some time since, a project was formed in Sweden to destroy all the crows; but it was observed that these birds were not only fond of grain and plants, but that they devoured immense numbers of worms and caterpillars, which subsist entirely upon the leaves and roots of vegetables. In North America they used every exertion to drive away the sparrow tribe; but, in consequence of this measure, the gnats multiplied so prodigiously in the marshy countries, that whole tracts of land were left uncultivated.

Pheasant-hunting is so considerable in the isle of Procida, that it occasioned the king of Naples to prohibit the use of cats to the inhabitants. At the end of a few years, however, the rats and mice increased so much, and occasioned such mischief, that this order was abolished.

And why should we be so selfish as to envy creatures the small part of our provisions which they require for food? Can we possibly consume all that nature produces? Shall we want any thing for our support or pleasure, because birds, mice, and insects, help us to consume the blessings which God grants in such profusion, and of which a part would be wasted, were not the animals to feed on it? Instead, then, of giving way to unjust complaints, let us rather acknowledge

the wisdom of our Creator. Every thing in the vast empire of nature is connected. No creature is useless, or placed there without design, although the use of many animals is unknown to us. Their mere existence should suffice to convince us, that they were created for the wisest purposes. Thus the apparent destructions and disorders in nature should make us look up to a God, who has created nothing in vain; who preserves nothing without a reason; and who, if he permit any thing to be destroyed, it is not without a wise design. Were we thoroughly convinced of these truths, all the works of God would lead us to glorify and bless him.

## AUGUST XI.

### *Variety of Colours.*

When we consider how dull and melancholy the country would be, and how confused all objects would appear, if there were only one colour, we must acknowledge the wisdom and goodness of God, who, by forming such a variety of hues, has increased and diversified our pleasures. Had he not designed to place us in an agreeable habitation, why should he have adorned all its parts with such various and beautiful paintings? The sky, and all the objects seen at a distance, are painted in the great style: splendor and magnificence are their characteristics: but lightness, delicacy, and the minute graces, appear in the

objects designed to be seen near, such as foliage, birds, flowers, &c.

But whence proceeds the distinction of colours? Each ray of light appears to be simple; but, by refraction, it divides into several; and hence arises the diversity of colours. A glass of water, placed in the sun, reflects certain colours on white paper; and angular glasses, or prisms, well cut and polished, reflect still more vivid colours. By holding a prism toward the sun, or by receiving a ray of light upon it, through a small hole in a window-shutter, we may see all the colours of the most beautiful rainbow. And these are in proportion more or less vivid, according as the refraction of rays is more or less strong. The most refrangible ray is the violet; and, consequently, it is the weakest. Afterwards comes the indigo; then the blue, green, yellow, and orange; and lastly the red, which is of all the least refrangible.

The nature of coloured bodies contributes to the variety of hues. The smallest parts in almost all bodies are transparent. This is the cause of their breaking, absorbing, or reflecting the rays, sometimes one way and sometimes another, like prisms. Besides, what proves that colours are not inherent in bodies is, that the neck and plumage of a pigeon or peacock, and certain stuffs, as taffetas, &c. change colour according to the position in which they are placed. This may enable us to comprehend whence the diversity of colours proceeds. The whole is comprised in this, that the surfaces of all bodies are composed

of extremely small flakes, which, according to their different thicknesses, reflect some coloured rays, while they admit or absorb others in their pores. Thus, when a body, whose surface is smooth, reflects and throws out almost all the rays of light, it appears *white;* and when, on the contrary, it absorbs them, it is *black.*

Let us, here, admire the goodness and wisdom of God. If the rays did not divide, and were not differently coloured, every thing would be alike, and we could only distinguish objects by reasoning, and by circumstances of time and place. How tedious and perplexing would it be, if we were obliged to distinguish one thing from another by reasoning! Our whole lives would be taken up in studying, rather than in acting, and we should be for ever in a state of uncertainty. Were there but one colour in the world, our eyes would soon be tired; and this dull uniformity would give us more disgust than pleasure. But the different colours which God has ordained serve to spread more beauty on the earth, and to afford pleasures ever new to the eye. This is a fresh proof, that God, in the formation of the world, not only considered the essential perfection of his works, but adorned them also with every thing which could enhance their value. In the mixture and different shades of colours, the useful and the beautiful are ever united. As far as our sight can reach, we always discover new charms in the fields, the valleys, and the mountains. All contribute to give us pleasure, and all ought to excite our gratitude.

## AUGUST XII.

### *Buildings of the Beavers.*

If a man who had never heard of the industry of beavers and their manner of building, were shown some of their edifices, he would certainly suppose them to be the work of some skilful architect. The whole performance of these amphibious creatures is wonderful. The regularity of the plan, the size, solidity, and admirable contrivance of their buildings, must fill every attentive observer with astonishment.

The beavers choose a place to build on where they can have plenty of provisions, and near a river, in order to have a reservoir of water to bathe in. They begin by constructing a dike, or bank, which keeps the water on a level with the first floor of their building. This bank is sometimes a prodigious work, from ten to twelve feet thick at the foundation: it is made sloping, and diminishes insensibly, till it is but about two feet in breadth at the top. The only materials of this dike are wood and clay. The beavers cut pieces of wood, as thick as a man's arm, with wonderful facility. They fix these perpendicularly in the ground, very close to each other, and interweave them with other pieces smaller and more pliant. But as the water might still run through, and leave their reservoir dry, they have recourse to clay, which they well know where to find, and with which they fill up all interstices

both within and without. And in proportion as the water rises, they continue to raise their bank.

Having completed their dike, they begin to work at their houses, which are round or oval buildings, divided into three stories, raised one above another: one of them is below the foundation of the dike, and generally full of water: the other two are above it. They fix these little buildings in a very solid manner on the edge of their lake, and always by stories, that, in case of the water rising, they may still be able to lodge above it. If they find a little island near the watering-place, they build their house upon it as being more solid, and they are less incommoded by the water, in which they cannot remain long at a time. If they do not find this convenience, they, with the help of their teeth, force piles or stakes into the ground, to support the building, and preserve it from wind and water. They make two doors at the bottom to go out into the water: one leads to their bathing-place; the other is a passage to the place where they carry all the dirt, &c. from their upper apartments. They have a third door, higher up, for fear of being taken when the ice closes up the lower apertures. Sometimes they build their houses entirely on dry ground, and dig ditches five or six feet deep, to get to the water. They use the same industry, and the same materials, for the buildings as for the dikes. The walls are perpendicular, and about two feet thick. They cut off with their teeth the ends of the sticks which project from the wall: then, mixing clay with dry grass, they plaster both the inside and

outside of their building; their tail serving as a trowel on this occasion. The interior of the house is arched, and its size is proportioned to the number of inhabitants. A space twelve feet long, by eight or ten wide, serves for eight or ten beavers. If the number be greater, they enlarge the building accordingly.

The *instruments* which the beavers employ, are four strong and sharp teeth: two fore-feet, the claws of which are divided; two hind-feet, furnished with membranes; and a tail covered with scales, and formed like an oblong trowel. With these few simple tools they excel our masons and carpenters, provided as they are with trowels, squares and hatchets. With their teeth they cut all the wood they require for building; they make use of their fore-feet to dig the ground, and to soften and mix the clay; their tail supplies the place of a wheel-barrow to carry their mortar or clay, and afterwards serves as a trowel to plaster it on.

The works of the beaver have the greatest resemblance to those of men; and, if we were to judge by the first impression they make upon us, we should suppose them to be produced by rational beings. But, on a more attentive examination, we shall find, that in all their proceedings, these animals act not upon reflection, but from mere natural instinct. If reason and reflection guided their labours, they would build differently now from what they did formerly, and would gradually improve in the style of their architecture. But we find that they continually follow the method of their progenitors; and never de-

viate from the plan which nature has prescribed to them. Hence the beavers of the present age build exactly in the same manner as those which lived before the deluge. But this does not render them unworthy of our attention and admiration, as, of all animals which live in a social state, they come the nearest to the human race. We need only observe them, to be convinced that beasts are not mere machines, but that all their actions and motions are directed by a higher principle. Yet, what infinite difference has the Creator placed between them in their faculties! How vastly superior is the instinct of the beaver to that of the sheep! and what Divine wisdom is manifested in those gradations by which brutes insensibly approach to the human species! May we profit by our discoveries of the different faculties of animals! and may we make use of them, by improving our knowledge and love of the Creator of all beings!

## AUGUST XIII.

### *Manner in which the Nutrition of the Body is effected.*

ALIMENTARY matter may be considered as consisting of two parts: the one nutritious, which should continue in the body; the other not nutritive, and which should be expelled. It is indispensably necessary that our food should be broken, and its parts separated. This is begun in the

mouth by chewing, or mastication. The incisors, or fore teeth, cut and divide the pieces; the canine, or side teeth, tear them; and the double teeth grind them small. The tongue and lips also contribute to this process, by keeping the food under the teeth as long as necessity requires. Certain glands, being compressed in the act of mastication, throw out a quantity of saliva to moisten the alimentary matter, and render it more easily divisible, as well as to contribute to its digestion. Hence we perceive the advantage of properly chewing our food before it be received into the stomach.

The food thus comminuted, mixed, and moistened, is received into the pharynx, or beginning of the throat, and passes through a canal where there are glands which continually secrete a liquor to lubricate the throat, and render the passage of the aliments more easy. When this happens to be too dry, we feel the sensation of thirst, which excites us to drink. The food follows the course of the œsophagus, or gullet, till it descends into the stomach; in which, by the action of a fluid called the *gastric juice*, digestion is performed. When we have too long abstained from eating, this fluid irritates the nervous coat of the stomach, and produces the sensation of hunger. The stomach is in perpetual motion, owing to the contraction of its fibres from above downward; so that its cavity is straitened, the lower termination rises toward the centre, and the whole is equally contracted. The food, prevented from returning into the œsophagus, by a

valve covering the upper orifice of the stomach, passes through the pylorus, or inferior opening, into the intestinal canal; which, strictly speaking, is a continuation of the stomach. This canal is subject to a constant motion, called the peristaltic motion; by which the whole alimentary mass is completely agitated. By the preceding operations the aliments are reduced to a kind of soft paste, which passes slowly through the intestines by means of their vermicular motion; and is afterwards mixed with the bile, which is secreted by the liver, and stimulates the intestines to action. The orifices of certain fine vessels called lacteals are discovered in each intestine; and the whitest and purest part of the alimentary mass, passing through these, is conveyed into a larger vessel, by which it ascends through the chest, and is thrown into the veins. It then loses its whiteness in the colour of the blood; and, thus prepared and perfected, it is conveyed by numerous canals into different parts of the body, to which it imparts life and nourishment. The gross and innutritious part, which is found in the large intestines, passes into the rectum, and in due time is expelled from the body.

What a variety of operations are requisite to accomplish one of the necessities of the human body! How many parts and organs concur in providing for the growth and nourishment of the whole! The digestion of food, and the secretion of so many different juices, must be effected by the intimate connexion which subsists between the external parts of the body: and it is worthy

of remark, that whilst these are exercised to effect our nutrition, they serve also for other purposes. The tongue, for example, is useful in mastication, but it is also the organ of speech and taste. And this is certainly a demonstrative proof of our Creator's wisdom. Let us frequently reflect upon this subject, and it will furnish us with a rich fund of useful and interesting meditations.

## AUGUST XIV.

*Nature considered in different Points of View.*

THE works of nature, so superior in every respect to those of art, are particularly distinguished by that admirable variety which continually affords new subjects of pleasure and surprise. We look once or twice at a work of art; and if we do return to it again, we at last grow tired, and regard it with perfect indifference. But when we attentively examine and reflect on the works of nature, our mind, instead of being fatigued, experiences new delights, and could continue the contemplation for ever.

When we consider nature in her most *sublime* and *majestic* point of view, we are astonished at the immensity of the heavens, the inconceivable multitude of the stars, and the immense extent of the sea. Compared with these, all the works of art, however great and excellent in themselves, are insignificant and contemptible. All that God has made, and all that he does, is stamped with a grandeur far surpassing our conception. To

give us an idea of his infinity, he had only to form the starry sky; which displays the magnificent greatness of the Deity, more than all that the earth contains. Is there any thing so well adapted to inspire us with profound veneration for God, as the contemplation of these great works? With what religious awe should we be inspired, on beholding those great phenomena of nature, which no mortal could produce, such as earthquakes, volcanoes, inundations, storms, and tempests; all of which forcibly impress the mind with a sense of the majesty of the Creator of heaven and earth. Nature also presents itself in the most *pleasing* point of view. We behold valleys adorned with verdure and beautiful flowers; fields promising luxuriant harvests; and hills covered with trees, vines, simples, and medicinal plants. In all these cheerful scenes, God appears as the friend and benefactor of mankind, who openeth his hand, and filleth all things living with plenteousness. This is the season in which all nature furnishes striking proofs of his goodness and munificence. Every thing combines to please and flatter our senses, to support and rejoice us.

But the time will soon come, when nature will appear under a *sad* and *gloomy* form: it will lose much of its beauty and variety; and will resemble a desert which promises neither riches nor pleasure. Each day brings us nearer to that gloomy season; and the lengthening evenings already warn us that we must soon confine ourselves to our apartments. But, even under this form, nature has many attractions, and winter

itself concurs in the perfection of the creation; for without it we should soon be deprived of the pleasures of spring and summer. Let us apply these reflections to our own lives: they are equally liable to variation, and are continually assuming new forms. To fine and cheerful scenes, the most dull and melancholy often succeed. In prosperity, therefore, let us prepare for adversity; and in every situation let us bless and praise the adorable Author of our being.

## AUGUST XV.

### *Mischief which may be occasioned by Rain.*

MODERATE rain always contributes to the growth and fertility of plants; consequently, it is an inestimable blessing to the earth. But when it falls too vehemently, or continues too long, it becomes hurtful to vegetables. When too violent, it forces delicate plants into the earth; and when of too long continuance, it prevents their growth. Excessive moisture deprives them of the necessary heat; the circulation of the sap is interrupted; the secretions are imperfectly performed; and the plants droop and are in danger of perishing.

This, however, is not the only way in which rain is prejudicial; as it sometimes occasions great destruction. When several clouds, driven by impetuous winds, meet in their course with towers, mountains, and other elevated places, they burst, and suddenly pour down the water with which they were filled. This frequently causes

much damage; for water, not being compressible, must, when pressed down, burst suddenly, and flow with great violence from mountains or other high places. It is not wonderful, then, that it should sweep away large stones, tear up trees, and throw down buildings; for two causes combine to render its effects more violent: on one hand its quantity, and on the other its rapidity increased by the height from which it falls; the action of a body which moves, being always in proportion to its mass and its velocity. Water-spouts are still more formidable. In figure they resemble an inverted cone, with the point towards the ground, and the base joining to a cloud. These water-spouts attract and draw up every thing in their way, and afterwards dash them down in the torrent. If the point of this conical stream touch the sea, the water boils, foams, and rises into the air with a terrible noise; but if it fall on buildings or vessels, it shatters and throws down the former, and shakes the latter so violently that they often founder. In all probability, this meteor is produced by the action of winds blowing in contrary directions, and meeting several clouds, which they drive violently against each other. When these opposite winds strike the clouds on one side, they, of course, occasion their turning round rapidly; and in this circular motion they assume the form of a whirlwind; and, their weight being suddenly increased by the force of pressure, they fall down impetuously; and in their fall they take the form of a column, sometimes conic, sometimes cylindrical, which turns

round its centre with great rapidity and violence, in proportion to the quantity of water and to the velocity of its descent.

Cataracts and water-spouts are always dangerous. Fortunately, the latter are very rare on land, though they are frequent at sea. As to cataracts, mountainous countries are more exposed to them than those which are flat and level; and they happen so seldom, that many years pass without an acre of ground being destroyed by them. However this may be, it is very unjust to murmur when these disasters happen. Many people are greatly affected by these events; they look upon them as most fatal, and their imagination multiplies and magnifies each object of terror. When a little corner of the earth which, in comparison of our globe, is a mere speck, happens to be laid waste by a water-spout, or any similar accident; we are apt to complain as if all nature were in danger of perishing: and, completely absorbed in the contemplation of these local and transitory disasters, we forget the innumerable blessings which God diffuses over the earth, and which far outweigh his occasional judgements. If we were just, we should be more affected with the general order and happiness resulting from the present plan of nature, than with those partial evils which are not in the common course of things, and ought only to be considered as exceptions to a general rule. Would it not be both unjust and ungrateful, to observe only the storms, earthquakes, and inundations, which seldom occur, while we forget

so many daily blessings, and those numerous advantages which accrue to us from the constant and regular return of the seasons? Do we not sin against God, if we only consider the mischief which certain accidental things occasion, without reckoning the multitude of blessings we daily enjoy?—Let us never henceforth be guilty of such criminal and thoughtless ingratitude. Let us rather reflect, with humility and admiration, on the works of God, and endeavour to form just and suitable notions of them. There are certain things in which *we* can scarcely discover any vestige of infinite wisdom, and benevolent design; but if we cultivate the study of nature with an attentive and religious mind, these will be gradually unfolded, and our errors will be rectified.

## AUGUST XVI.

### *The Care of Animals for their Young.*

THE most remarkable instinct implanted by nature in animals, is that which they discover in the preservation of their young. Few creatures abandon their progeny to blind chance. On the contrary, their love extends to their posterity in the most solicitous manner, and operates in that way which is best adapted to their nature and different modes of living.

Some of those little creatures which are hatched from the eggs of fish and insects, have no need of being covered by the parent; as the heat of the

summer is sufficient to animate and strengthen them, and they are capable of providing for themselves from the first moment of their birth, provided they are in a suitable place, and have food within their reach. Fish and amphibious animals cannot distinguish their own young from others of the same species, and yet nature teaches them the best means of providing for the chief wants of new generations. Fish come in shoals to deposit their eggs near the shore, where the water, being shallow, is easily warmed by the sun, where they may be more easily hatched, and afterwards find a supply of food. Amphibious animals leave the water to lay their eggs in the sand, where they may be exposed to the heat of the sun, as if they knew that their young would readily find their true element, and the place where they are designed to live and find nourishment. Gnats, and other insects, which are born in the water, but live either on the earth or in the air, always lay their eggs where the life of their young is to begin. Insects which fly upon the earth, and which, in general, require no food for themselves, still take care to deposit their eggs on plants, fruit, flesh, and other substances, which serve to nourish their young. There are some which pursue other animals, in order to lay their eggs in their skin, hair, mouth, or entrails. Some animals deposit their eggs in nests which they have prepared, and stored with provision necessary for their young.

Other animals, which are helpless at their birth, are consigned to the care of their parents.

How anxious are the birds, even before they lay their eggs! With what assiduity and patience they brood over their eggs for several weeks, scarcely giving themselves time to eat! What care they take to warm their young, when they are hatched, and to give them proper food! What courage they display in defending and securing them, at the hazard of their own lives! Is it not also a very singular instinct in quadrupeds, which induces them to cut with their teeth, the umbilical cord of their young, and to do it with proper precautions, that they may not lose too much blood? With what tenderness and attention do they suckle them, and guard them from all danger! In general, the instinct of animals for the preservation of their young, is stronger than the desire of satisfying their own wants. They suffer hunger and thirst; they refuse themselves sleep; they even expose their own lives, rather than neglect their little ones.

In this instinct, which God has implanted in animals, we may observe the most admirable wisdom; for the preservation of every species depends on the care of the parents. It is not wonderful that viviparous animals should be fond of their young; because they are their own flesh and blood. But that oviparous animals should feel such solicitude for their eggs, is absolutely inexplicable. The eggs are entirely different in form from the parents, and in every respect unlike any animal. Besides, they are not visible when the birds begin to construct their nests, and

when the insects seek places where their progeny may find subsistence.

Adorable Creator of the universe! who does not here perceive and admire thy Almighty wisdom? Who does not acknowledge thy goodness in watching over the preservation of the animal world; making it subservient to our wants and our gratifications? Open our eyes, that we may more clearly discover the wisdom which shines throughout all thy works!

## AUGUST XVII.

### *Several Sorts of extraordinary Rain.*

Every phenomenon, however natural and useful it may be, is an object of terror and dismay to the ignorant and superstitious. We see a proof of this in certain rains which credulous people consider as ominous of evil, and altogether supernatural. Who does not tremble, when he hears of *showers of blood?* Sometimes, and particularly in summer, there falls a reddish rain, to which this name is given, or rather it is supposed that such a rain has fallen, when, after a common shower, some drops tinged with a red colour are seen in the fields. Hence it has often been attributed to supernatural causes. In reality, however, there is nothing in it but what is very natural: for the atmosphere being filled with different substances, and mixed with many foreign bodies, we need not be surprised that rain

should sometimes partake of this mixture. It may easily happen, that coloured particles may fall with the rain. The wind may raise and scatter about the coloured meal of many flowers, and even the red excrement of certain butterflies. There are also little red insects on the surface of the water, which credulous people may take for blood. Sometimes a certain viscous humour, produced by reddish oleaginous particles which float in the air, falls with the rain, as it happened in the year 1764 in Westphalia and other places. But this is so far from being wonderful, that it would, on the contrary, be extraordinary if these phenomena did not occasionally happen.

It is the same in respect to the showers of *brimstone*, which have been said to fall frequently. It is certainly possible, as the atmosphere is full of sulphureous particles, that some of these might mingle with the rain. But it has been found, by many observations, that these rains are only flowers, or coloured seeds of plants, or small sand and yellowish dust, which the wind raises and brings from different countries, that mix with the rain. The supposed showers of *wheat* are produced in the same way. When heavy rain falls in places where much small celandine grows, it uncovers the roots, which are very slender. The little scallions which adhere to them are then scattered about, and are supposed to be wheat fallen from the clouds, which superstitious people believe to be a presage of scarcity and famine.

But whence come all those *caterpillars* with which the gardens and fields are sometimes

strewed after rain has fallen? Nothing can be more natural than this. The atmosphere containing numberless different sorts of substances, it is very probable that insects and their eggs should mix in it. The latter only require a place to hatch in; consequently, when they fall with the rain, they stick to the leaves, and there come to life. The possibility of this is proved by the following fact, related by writers of the utmost probity: "The rains which fall in Philadelphia during the month of August, bring with them insects, which, when they adhere to men's skins, and are not immediately taken off, bite, and cause violent itching. And if these little animals happen to fall on woollen stuff, they fix in it, and multiply like moths."

We are not duly sensible of our obligation to naturalists, for having, by their inquiries and remarks, removed so many superstitious prejudices. It must, however, be confessed, that the common people still retain many of them; which shows, that men in general are more inclined to error than to truth, and that they are not convinced, as they ought to be, of the wisdom and goodness of the Divine government. Let *us* not dishonour our own reason, and God himself, by such prejudices. Let the conviction that every thing is well ordered in nature, be a source of joy and consolation to us. Pagans and infidels may be expected to cherish superstitious ideas; but let us, who have the happiness of knowing the true God, glorify him by faith, honour him by confiding in his goodness; and labour incessantly

to diffuse the blessings of reason, wisdom, and piety among our fellow-creatures.

## AUGUST XVIII.

### *Sensitive Plants.*

CERTAIN motions observable in plants render it doubtful whether they are not possessed of sensibility. Some vegetables shrink and contract their leaves upon being touched; others open and shut their flowers at certain fixed hours, so regularly as to denote with precision the time of day: some assume a peculiar form during the night, folding up their leaves: and these different changes take place, whether they are exposed to the air, or shut up in a close apartment. Those which live under water, raise their heads above it in the time of fecundation. And the motions of a marshy plant discovered some time since in the province of Carolina are still more singular. Its round leaves are furnished above and on the edges with a great number of notches, which are extremely irritable. When an insect happens to creep upon the upper surface of the leaves, they fold up, and inclose the insect till it dies; after which they open of themselves. Daily observation discovers regular motions in certain garden plants. Tulips, for instance, expand in fine weather, but close at sun-set, or during rain. Vegetables with pods, such as peas and beans, open their shells when dry, and curl themselves

up like shavings of wood. Wild oats, when placed upon a table, will move spontaneously, particularly if they have been warmed in the hand. And the sun-flower, and several other plants, always turn towards the sun.

From these incontestable facts, some persons conclude that we cannot deny *sensibility* to be an attribute of plants, and it must be confessed, from the above observations, that some probability is attached to this opinion. But, on the other hand, vegetables have no *other* sign of sensibility, and what they have appears to be entirely mechanical.

We plant a shrub, and destroy it, without finding any analogy between it and an animal which we bring up and kill. We observe a plant bud, blossom, and bear seed, as the hand of a watch runs over all the points of the dial. The most exact anatomy of a plant does not discover any organ which has the least resemblance to the seat of animal sensibility. When we oppose these observations to those whence the sensibility of plants may be inferred, we remain in doubt, and know not how to explain the above-mentioned phenomena. Perhaps all we observe in regard to the motions of plants, may only proceed from the construction of different fibres, which sometimes contract and sometimes expand. Perhaps the subtile exhalations of our bodies cause sensitive plants to shrink when we touch them. But it is also probable, that, as there are innumerable gradations in nature, the first degree of sensation may subsist in certain

plants; as, indeed, the step is very narrow between the sensitive plant and the muscle; sensibility may, therefore, extend even to plants, at least to those which approach nearest to the animal kingdom.

Upon this subject our knowledge is very imperfect, and confined to simple conjecture; for we can neither deny nor positively assert the sensibility of plants, with any degree of certainty. Let us then rest satisfied with ascribing to our Creator the glory that is his due, and be persuaded, that, whatever be the principle of these phenomena, the plan he has formed in this respect, as in all others, must be dictated by unbounded wisdom and goodness. Though these things remain obscure and problematical, we know enough to satisfy a reasonable curiosity. Let us, therefore, endeavour to apply the knowledge we have without losing time in speculations more curious than useful; and without being anxious to obtain that information, which is perhaps reserved for future and more enlightened ages.

## AUGUST XIX.

### *The Fear of Storms.*

At a time when nature presents to our eyes none but pleasing and delightful scenes, there are some people who still complain and murmur. Summer, they say, would indeed be delightful, if storms did not so often disturb the harmony of

nature, and banish all joy from our souls. The fear of storms and thunder is chiefly owing to the opinion of their being effects of the wrath of Heaven, and ministers of its vengeance: for if, on the contrary, we considered how much they contribute to purify the air from noxious vapours, and to fertilize the earth; if we would take proper precautions against the terrible effects of lightning; storms would cease to be so dreadful, and would rather inspire gratitude than terror. But it may be said, that thunder-storms often occasion great mischief. How frequently has lightning struck men and animals, and consumed whole towns and villages? But to this we may reply, that here, as in many other cases, terror greatly magnifies the evil and the danger. To show how little possibility there is of being struck by lightning, it may suffice to state, that, out of seven hundred and fifty thousand persons, who died in the space of thirty years in London, only *two* were killed by lightning. We may also observe, that, during the greatest claps of thunder, many people prolong their fear without reason. Whoever has time to fear the natural consequences of lightning, is already out of danger, for it is only the lightning which can be fatal. When, therefore, we have seen and not been touched by it, and when the thunder does not immediately accompany it, it is doubly foolish to turn pale, or tremble at hearing a clap, or to stop the ears for fear of a sound which is perfectly harmless as the report of a cannon. The thunder tells us we have escaped the danger, and, at the same time,

informs us at what distance it is: for the greater space of time there is between the clap of thunder and the flash of lightning, the more distant is the storm.

The surest means of guarding against the fear of thunder, or any other alarming phenomenon of nature, it to endeavour to acquire a good conscience. The good man, calm and composed, fears not the judgements of Heaven. He knows, that, at God's command, all nature is armed against sinners; but that the righteous are continually under the protection of the Most High. "He hears the thunder roar, but he trembles not. His Creator, the God whom he adores, commands the storm, and knows when to terrify, and when to strike. He sports with the tempests and storms. He makes use of them to convince the infidel who dares doubt his existence, and to appal the souls of the wicked. The friends of Jehovah have no cause of alarm; on the contrary, it is their privilege to trust in him, even when the terrific voice of his thunder is heard; and a time will come, when, raised above the stormy regions, they shall walk upon the clouds by the brightness of his lightning." Then shall they perceive that thunder itself is a blessing ordained to purify the atmosphere; and then shall they adore the Supreme Being, who, under the most terrific appearances, condescends to supply the wants of the earth. With one hand he grasps the thunder, and with the other he waters our fields; thus exhibiting himself at once as our Father and our Judge.

## AUGUST XX.

*Summer presents us with Images of Death.*

A FEW weeks ago our gardens exhibited the most pleasing scenes, where every thing inspired serene delight; but now the prospect becomes daily less agreeable and less varied. Most of the flowers which then adorned our gardens have disappeared, and those which remain serve but to recal the transporting scenes which have now receded from our view. These revolutions in nature are very instructive. There is a time of life in which we have all the charms of spring: we are then admired and loved, and excellent fruit is expected from us. But how often is this expectation disappointed! The blossoms drop off even previous to their expansion: a fit of sickness robs us of all our charms, and a premature death puts an end to all hopes. We observe the spring-flowers, which last till summer wither them in a few hours—a striking emblem of death! Scarcely a day passes in which we do not behold men snatched away by sudden death, when they least expect it—one of the many means which God makes use of to draw us to our end. It is true, that, from habit, we become almost indifferent to the deaths of so many of our fellow-creatures; but it is not less true, that "the days of man are as the grass of the field: in the morning it is green, and groweth

up, but in the evening it is cut down, dried up, and withered."

We are now in that season in which we endeavour to avoid the heat of the sun, and seek the cool shade of the sequestered grove. But are not such retreats calculated to make us reflect on the silence and darkness of the grave, where we expect to find rest, after the fatigue and heat of the day?

The reaper prepares to cut his corn, the sickle levels the tall ears on the right and on the left; and leaves desert and empty fields behind. This should remind us of our own lot, for all flesh is as grass, and the whole duration of this life, with all its glory, is but as the flower of the field. Man flourishes for a short season, and is cut down, when the Great Ruler of the harvest ordains it. The very bees proclaim this truth: when we reflect on the activity and industry with which they gather and prepare their honey, we should learn to lay up early treasures of wisdom and virtue, which may be a comfort to us in our old age, and in the hour of death.

The husbandmen will soon unite in gathering the fruits of the earth, to lay them up in their barns. These days of harvest are the most solemn and important of the whole year. But, O God! what solemnity will be attached to that great day in which the Creator himself shall collect the harvest; when all the dead shall rise out of their graves, and the Supreme Judge shall say to his angels, "Gather ye together first the tares, and bind them in bundles, to burn them,

but gather the wheat into my barn!" With what joy may the righteous anticipate that day of harvest! "He that now goeth on his way weeping, and beareth good seed, shall, doubtless, come again with joy, and bring his sheaves with him."

These are not the only emblems of death which nature furnishes, but they are the most striking. The man who reflects upon them can only consider them as pictures of the brevity and frailty of life; and there is no danger that such reflections as these should disturb the cheerfulness which is so natural to us in summer. Meditations on death are the best means of improving this happy season, and rendering it still more agreeable. When once we contemplate death in its proper light, far from considering it as an enemy of true pleasure, we acknowledge that the idea of it ennobles and increases our happiness. Should we run into imprudent excesses in these summer days, if the thought of death were present to us? Should we make an improper use of God's blessings, if we remembered the approach of that hour in which we must give an account of our stewardship? Would the blessings of this life corrupt and captivate our hearts, if we seriously reflected on their fleeting and uncertain nature? Would the burden we sustain in the heat of the day, or the miseries to which we are exposed, excite our murmurs, if we reflected that the evening would bring us refreshment and repose? Should we place our chief happiness in the enjoyment of the world and its pleasures, if we

accustomed ourselves to think, that purer, nobler, and eternal pleasures awaited us in another and a better world?

## AUGUST XXI.

### *Causes of the Heat of the Earth.*

One of the principal causes of the heat of our globe is the sun; and its position, in regard to a particular part, increases or diminishes the warmth that is there felt. When the sun is on the southern side of the earth, the inhabitants of the north have not such warm days as when he approaches the northern pole. The same thing is observable in the southern parts of the earth, when the sun is turned towards the north. In climates where the sun is almost vertical, the cold is never so intense as to freeze the rivers or lakes, the heat being always considerable in those regions. It becomes excessive when the sun continues long above the horizon, and, by that means darts its rays a considerable time on the same place. This is the reason, that, towards the poles, where the days are very long, the heat is sometimes intense in certain countries. When all this is considered, we must necessarily conclude, that the sun, and its positions with regard to the earth, form the chief causes of the heat in the open air.

This, however, is not the *only* cause; for if it were, all winters would be equally cold, and the

temperature of the air must be exactly the same in all countries situated in the same climate. But neither of these is the case. It is observed, that, on the highest mountains, where there are spacious plains, and on these plains other hills and plains, it is still much colder than in low lands and deep valleys. Even under the line, if, from a plain where the heat is oppressive, we ascend a mountain 12,000 feet high, we shall feel the most piercing cold. It has also been remarked in winter, that, when the cold has been severe during the day, it has sensibly diminished towards midnight, and the weather became temperate, though the rays of the sun did not then warm the atmosphere. It is, therefore, certain, that there is a heat in the air which is not immediately produced by the sun.

There are certain bodies, which by friction, or percussion, grow warm, and emit sparks. The axletrees of wheels take fire when the carriages go too fast, and have not been properly greased. Other substances grow warm, and enkindle, when they meet together. If a certain quantity of water be poured on a truss of hay or straw, it will occasion a considerable degree of warmth. Bodies which corrupt or ferment, often require an increase of temperature perceptible by the thermometer, or merely by the touch. Even in the air, the motion of certain substances may occasion mixtures, dissolutions, and combinations, which produce a great degree of heat. Thus we may account for the production of heat in

the open air. In the first place, the sun is the principal cause of it: to the heat proceeding from this luminary is united that of many living creatures; that of fire produced by wood, coal, and other combustibles; and that which comes out of the bowels of the earth, the bottom of the sea, and from warm mineral springs. The heat is often much increased by the fermentations which different bodies undergo, whether on the surface of the earth, or in the upper regions of the atmosphere, where they produce warm exhalations. When, therefore, the numerous particles which float in the lower atmosphere, and which are capable of receiving and retaining heat, are not cooled, nor dispersed by wind and rain, their heat gradually increases till it becomes intense. On the contrary, it abates, when any of the above-mentioned causes cease to act.

All these plans are worthy of the wisdom and goodness of God; they are useful to all the habitable parts of the globe; and he has granted to each climate that degree of happiness of which it was susceptible. But we who live under a temperate climate, most sensibly experience the paternal care of our kind Creator. Heat and cold are dispensed to us in the wisest proportion: and we should be the most ungrateful of beings, were we not to acknowledge and praise the goodness of God towards us.

# AUGUST XXII.

## *Variety of Plants.*

One of the things particularly deserving our admiration in the vegetable kingdom, is the great variety observable in plants, with respect to their parts, fructification, and properties.

The manner in which fructification is performed in many plants is very obscure. We know very little, for example, of its process in mosses, mushrooms, and ferns. Some plants exhibit singular monstrosities. We see flowers which have no heads; and there are some from the centre of which other flowers spring. Certain plants which are termed *soporiferous*, assume a different position at the approach of night, to what they had in the course of the day; others turn towards the sun; and some shrink and contract when we touch them. There are flowers which open and shut at certain regular hours, and some shoot up, blossom, bear fruit, and drop their leaves earlier than others.

All plants are originally wild, and once grew without culture; the Creator having assigned to them different climates adapted to their nature and properties, and where they might best come to perfection. But those which are exotic may be naturalized with us, and made to succeed very well, provided care be taken to procure for them the degree of heat, suitable to their nature,

What renders the contemplation of plants particularly interesting is their great diversity of form. Let the most perfect species be compared with those that are least so, or let even the different species of the same class be compared, and we cannot but admire the astonishing variety of models from which nature works in the vegetable world. We step with wonder from the truffle to the sensitive plant, from the mushroom to the carnation, from the acorn to the lilac, from the nostoch to the rosebush, from the moss to the cherry-tree, from the morel to the oak, from the misletoe to the orange-tree, and from the ivy to the fir.

If we consider the numerous tribes of mushrooms, or the different kinds of plants which are called imperfect, we cannot but admire the fertility of nature in the production of those vegetables, which are so different in form from others that we can scarcely rank them among plants. If we rise some degrees higher in the scale of plants, we behold with pleasure the degrees of those with stalks, from the grass which grows between the stones, to that inestimable plant to which we owe our principal food. We, in the next place, observe the variety of creepers, from the tender bindweed to the spreading and luxuriant vine.

What we can never sufficiently admire in the works of nature is, that the most perfect harmony is blended with this immense variety. All plants, from the hyssop which grows on the wall, to the cedar of Lebanon, have the same essential parts.

A little herb is as complete a plant as the most beautiful rosebush, and the rose as the most lofty oak. All belong to the same source; all follow the same general laws of growth, propagation, and increase: and yet each species is distinct from the others. Among so many thousands of plants, there is not one which does not possess its distinct characteristics, properties, and mode of propagating itself. What inexhaustible riches are discoverable in their colours, forms, and proportions!

Those persons are peculiarly happy who are capable of observing this variety, and of appreciating the different beauties of the vegetable kingdom. What pleasure may the mind experience in such a study! After having once enjoyed it, we find so many charms in it, that we could readily give up all other pursuits to devote ourselves entirely to this. May our souls, enraptured with such sweet contemplations, rise to thee, O God, who art the Father of all nature. Thy power, which produced every plant; thy wisdom, which so well planned them; thy goodness, which appears in the infinite variety of them; furnish us with continual cause to bless and glorify thy holy name.

## AUGUST XXIII.

### *Reflections on the Animal Creation.*

THE animal kingdom may be considered as a well-governed state, in which a proper number of inhabitants are found in their respective and allotted situations. All have faculties necessary for the performance of their duties, and rewards and punishments to excite them to action; with a sufficient protection against their different enemies. Those which are small and feeble are obliged to submit to the strong and powerful; and all are under subjection to man, as the representative of the Deity.

The inhabitants of the animal kingdom find, in all parts of the globe, a sufficiency of food and employment. They are accordingly dispersed in every direction; and their nature, organs, and constitutions, are adapted to the different situations assigned them. Their employments are various, but all tend either to increase their species, to maintain an equal balance between the animal and the vegetable kingdom, to provide proper food, or to defend them from their enemies. All the parts of their bodies are adapted to their nature and functions. The Creator has given them certain instincts, which compensate for their want of reason; and these are diversified in a thousand ways, according to their various necessities. Hence we discover in them instincts for motion; instincts to enable them to discover, seize, and prepare their food;

instincts to construct nests, and other necessary places of abode; and instincts to propagate their species, and to defend themselves from danger.

In each class of animals there are some that live on prey, and on the individuals which superabound in other classes. Each species has its particular enemies, which keep up the proper balance, and prevent any from multiplying too fast. Animals that are weak, or have some defect, are commonly the first which fall a prey to others: and decayed carcases are speedily devoured; so that the earth is not incommoded by them, nor the air infected; but nature preserves its beauty, freshness, and purity.

Beasts of prey have a structure conformable to their mode of life. They are endowed with peculiar strength, agility, industry, and address. But, in order to prevent them from destroying whole species, they are confined within certain limits; they do not multiply so fast as other animals; and they often destroy one another, or their young become a prey to other creatures. Some sleep during the winter, digest their food slowly, and feed on the fruits of the earth, when they can procure no other aliment. Weaker animals are provided with defence, in proportion to their situations and the dangers to which they are exposed. Their natural weapons, their swiftness, their habitations, or their cunning, preserve them from destruction: and, by these means, the proper balance is always preserved in the number of every species in the brute creation.

Animals are, in some measure, obliged to per-

form the functions assigned them; because upon this their comfort depends. They find their advantage in following the laws prescribed by nature; and cannot transgress them without subjecting themselves to various evils. The class of *mammalia*, or animals which give milk, are the largest, and, consequently, the least numerous; but they fulfil very important offices. Birds also have a variety of functions to perform: they eat up superfluous seeds, devour dead carcases, and diminish the number of every sort of insects. Most amphibious creatures prey on others. The smallest animals are the most numerous, and, in proportion, more voracious than the larger. These manure many vegetables, and serve for other useful purposes.

All the admirable things we behold in the animal kingdom tend to demonstrate the existence of a Being who possesses the highest degree of wisdom and knowledge. Who but himself could have peopled this immense globe with so many different species of living creatures, providing for them every thing necessary? Who but God could have nourished such multitudes of animals, according to their different tastes; provided them with coverings, weapons, and habitations; and given to all so many instincts and capacities? Who but he could have preserved the balance between so many different species and classes of animals? Who but Jehovah could have assigned to all living creatures their appropriate aliments: or formed, joined, and articulated their limbs, bones, muscles, and nerves, with such perfection

of harmony, that each animal can perform its several motions in a manner the most convenient and best adapted to its way of life and the different situations in which it is found.

O Lord God Almighty! it is thou only who couldst do such things, and to thee all glory, praise, and thanksgiving are continually due.

## AUGUST XXIV.

### *Division of the Earth.*

All the known world is divided into four principal parts; Europe, Asia, Africa, and America.

Of these divisions *Europe* is the smallest; extending only 3300 miles in length, from east to west, and about 2350 in breadth, from north to south. Its inhabitants, however, possess many countries in the other quarters, and have nearly one half of the globe under their subjection. The Europeans traverse every part of the earth, and bring home the produce of every clime. They are also the most enlightened of mankind, and cultivate the arts and sciences with the greatest success. Europe is the only part of the globe that is every where cultivated and covered with towns and villages; the only place where the inhabitants keep up a constant intercourse, and profess nearly the same religion. The other quarters are inhabited by a multitude of different nations, who have little connexion together, who scarcely know each other, and differ as much in their manners as in their religion and mode of living.

Asia is inferior in size to America. Its supposed length from the straits of Gallipoli, in the west, to the eastern shore of Tartary, is 4800 miles ; and its breadth from the southern extremity of Malacca to the frozen ocean is nearly 4500 miles. As the countries situated in the interior of the continent are not refreshed by the cooling sea breeze, nor watered by many rivers, as they contain vast plains and barren mountains ; the heat and cold are both intense, and the earth, possessing little fertility, is seldom cultivated. Even at the present time, those countries are only inhabited by people who in the morning pull down their towns and villages, to carry them some miles farther, and build them up again at night in an hour. It seems as if nature had made this wandering and unsettled life necessary ; and intended, that the establishment, laws, and government of these peoples hould be less durable and more subject to change than elsewhere. The other inhabitants of Asia often suffer from the restless and unquiet character of these wandering tribes. The northern part, which abounds with lakes, marshes, and forests, has never been regularly inhabited; but the southern, eastern, and western parts are the finest countries in the world, and are wonderfully fertile, producing the necessaries of life in great abundance.

Africa is a peninsula of very great extent ; being about 4300 miles in length from Cape Bona to the Cape of Good Hope ; and 3500 in breadth from Cape Verd to Cape Guardafin. It lies under the torrid zone, and contains immense

sandy deserts, mountains of prodigious height, forests almost burnt up, and monsters of every description. The oppressive heat enervates and weakens every faculty of the soul. The interior, notwithstanding its comparative contiguity to Europe, is as yet but little known; and very few well-regulated states have been discovered.

America, which was discovered by the Europeans in the fifteenth century, is the largest division of the known world, extending nearly 9000 miles in length, and 4400 in breadth. It is divided into two continents, separated only by a very narrow isthmus, or neck of land, and surrounded by a number of islands. The cold climate of the northern part, its few productions, and its distance from inhabited countries, prevent its being entirely known as yet; but we have reason to believe that the natives are uncivilized. Forests and marshes still cover the land, and, hitherto, the Europeans have only cultivated the eastern coasts. In the south of America there were formerly great empires: the remainder was inhabited by savages. Serpents, reptiles, and insects are much larger here than in Europe. It may be said, on the whole, that America is the most extensive and the least populous part of the world.

If we reckon the number of leagues these four parts of the world occupy, their size will appear very considerable: yet all the known countries make but a fourth part of the globe. And what is our earth in comparison with those immense bodies which God has placed in the firmament! It is lost in the innumerable multitude of ce-

lestial spheres, like a grain of sand in a stupendous mountain. To us, however, in whose eyes a cubit appears considerable, the terrestrial globe is still a great scene of the wonders of God. And, as we know but little of the worlds above us, let us at least endeavour to know that which we inhabit, and to consecrate that knowledge to the glory of God.

## AUGUST XXV.

### *The Nature and Properties of Light.*

THOUGH we every moment experience the utility of light, we cannot, with certainty, decide its nature. All that has been said on the subject is conjecture. Perhaps light is a fluid substance, by which we are surrounded, and which only may require, in order to be perceptible, the being put in motion by the sun, or some other inflamed body; or, perhaps, it is fire itself, which, by the emanation of its infinitely subtile particles, gently strikes our eyes at a certain distance. The first of these hypotheses has been adopted by the most eminent philosophers. It is certain, at least, that there is a great difference between fire and light. The latter is beyond all comparison more subtile than the former: it penetrates glass, and other transparent bodies, in a moment; whereas fire does it very slowly. The pores of glass, consequently, must be large enough for the light to pass through them easily; while the fire meets

more resistance, because it is less subtile. It is observable that fire moves much slower than light. If burning coals be put into a room, the heat will diffuse itself but slowly, and the air will only grow warm by degrees; but, as soon as a lighted candle is brought into an apartment, the whole is suddenly illuminated. From these and some other facts, we may conclude that fire and light are different substances, though generally seen to accompany each other.

The properties and effects of light are not less incomprehensible than its nature. If its velocity were not greater than that of sound, it would take up seventeen years to come from the sun to us, but it only requires from seven to eight minutes to do so. In that short time, a ray of the sun darts over many millions of leagues; and in the short space of *one second* a particle of light traverses an extent of a hundred and seventy thousand miles! Now as sound is propagated only at the rate of 1142 feet in a second, a particle of light must be 786,000 times more subtile than a particle of air, although the latter cannot be perceived by the naked eye, nor even with the best magnifying glasses. Besides, the observations of astronomers inform us, that the rays of a fixed star, in order to reach us, must traverse a space which a cannon-ball, shot with the greatest force, could not pass over in less than 104,000 millions of years. The extent or expansion of light is not less inconceivable. The space in which it spreads has no bounds but the universe itself, the immensity of which exceeds the limits of the human understanding. It is by this astonishing diffusion of

light, that the remotest of the bodies in the solar system becomes discernible either by the eye, or by the aid of telescopes; and had we glasses of sufficient power, we should be enabled to discover bodies in the most distant extremities of the universe.

It is certain that our understanding is too limited to comprehend all the designs of Omnipotence relative to the nature and properties of light; but by investigating it attentively, we might obtain much information upon this interesting subject. Why, for example, does light spread on all sides with such prodigious velocity, but that an infinite number of objects may be seen at the same time by a vast number of people; and that distance may not prevent their been seen? If the propagation of the rays of light were slower, great inconveniences must result to the inhabitants of our globe; the strength and splendor of light would be considerably diminished; the rays would be less penetrating, and the dispersion of darkness would be both tardy and difficult. Why are the particles of light so wonderfully subtile, but that they may paint even the most minute objects to the eye? Why have not these particles more density, but that they may not dazzle us by their brightness, nor injure us by their heat? And why are the rays so variously refracted if not to enable us more easily to distinguish objects?

Thus the Creator continually keeps in view the benefit and happiness of his creatures. What gratitude do we owe to the Father of Lights, for

such beneficent plans! Had he not created the light, how could we have enjoyed our existence? Of how many sources of pleasure should we have been deprived! And within what narrow limits would our knowledge and occupations have been confined!

## AUGUST XXVI.

### *The Formation of Birds.*

Birds may, undoubtedly, be ranked among the most beautiful creatures in the world. The form of their bodies, even in their smallest parts, is so regular and perfect, as at once to convince us of the wisdom of the Creator. Like the mammalia, or animals which give milk, they have real bones; but they are very differently clothed: their bodies are covered with feathers, fastened to the skin, laid over each other in regular order, and furnished with a soft and warm down. The large feathers are covered with smaller ones, and each consists of a quill and beard. The quill is hollow below, and thence the feather receives its nourishment: towards the top it is full of a sort of marrow. The beards are a range of little thin flakes, closely connected at the two edges. Instead of having fore legs, like a quadruped, birds have wings composed of eleven bones, in the muscles of which the feathers intended for flight are inserted. These feathers, turned back, form a sort of arch, strengthened still more by

two rows of smaller feathers, which cover the root of the large ones. The mechanism of the wings is truly admirable; they do not strike behind, like the fins of fish, but act perpendicularly against the air, which is under them, and which greatly assists the flight of the bird. The wings are hollowed a little, in order to take in more air, and the feathers are so closely united that the air cannot pass through them.

The body is suspended between the two wings in a perfect balance, and in the manner best adapted for the motions it is to perform. The heads of birds are small, that the weight may not retard the vibration of the wings, and to be more proper to cut the air, and make their way through that element. The principal use of the tail is not to supply the place of a rudder, but to preserve the balance in flying, and to assist the bird in rising or descending in the air. The legs are generally so placed as to keep the body in the centre of gravity; though in some birds they are so far back as to enable them to swim. The thighs are covered with muscles and plumage; but the legs are thin and generally naked. Most birds have four toes; three of which are before and one behind. At the end of the toes they have nails; which they use either to assist them to perch, seize their prey, or take up their food. Some birds feed on animals, others on plants, fruits, and grain. Those which live on seeds, steep and soften them in their crop; whence there can pass but a small portion of food at a time into the stomach, because in this sort of bird it is but

small, and composed of very strong muscles, by means of which the food is so much the better bruised and ground, as those birds generally swallow sand, and little hard uneven stones, to assist digestion. Birds of prey have much weaker stomachs; but they also have recourse to stones to facilitate its functions.

The bodies of birds are formed, throughout the whole, with such art and harmony, as to be perfectly adapted to their way of life, and their different necessities. The stork and the heron, which must seek their food chiefly in marshes, have long bills, and very long legs, that they may run into the water without wetting themselves, and reach far in to seize their prey. The vulture and eagle, which live only by rapine, are provided with large wings, strong claws, and sharp bills, which are necessary to preserve them from starving. The bill of the swallow is small and pointed and the mouth large, which enable her to catch a variety of insects in her flight. The swan has a particular reservoir in its wind-pipe, where it draws in air, while seeking food, with its head and neck plunged under water. Several small birds which fly and hop among thickets, have a membrane over their eyes, to defend them from injury. In a word, the formation of each bird is wonderfully adapted to its respective mode of life. Each species is perfect in its kind; and no limb is useless, superfluous, or deformed. The wisdom observable in this will appear still more extraordinary, if we consider that all the parts of birds are not only appropriated

to their different wants, but also concur to give them the most beautiful form. What a surprising diversity of construction, proportion, colour, and voice, do we observe between the raven and the swallow, the partridge and the vulture, the wren and the ostrich, the owl and the peacock, the crow and the nightingale! All these birds are beautiful and regular in their kind; but each has its peculiar beauty and regularity.

Thus may the sight of birds become useful and edifying to us, if we accustom ourselves to trace them up to the God who created them. Happy for us, if we make this use of his creatures. What an agreeable employment, what pure and celestial pleasures, may such reflections afford!

## AUGUST XXVII.

### *Reflections on the Sky.*

We need only contemplate the sky to be struck with admiration at the sight of this magnificent work of the Creator. How beautiful is this azure canopy, particularly during the night, when spangled by thousands of stars, and illumined by the mild lustre of the moon! Who can raise his eyes to this interesting spectacle without the sweetest emotion? But we discover still greater wonders, when, with the mind's eye, we traverse this immense space, and make it the subject of meditation. Where are the bounds

to this space? where its beginning or its end? Innumerable spheres of a prodigious magnitude there rise above each other; and the human mind that would attempt to follow them in their rapid courses, must soon confess its weakness. A pure ethereal air, infinitely subtile, fills that space, supports those prodigious bodies, and traces for them the circles in which they continually revolve. There are neither props nor pillars to support this immense vault; it is not suspended or fastened to any thing; and yet it has supported itself for thousands of years, and will continue to do so for ever.

How numerous and how stupendous are those celestial bodies with which the sky is filled! The magnitude of the sun and of many of the planets moving round him, is vastly superior to that of our earth. And who knows but among the stars there may be many equal, if not superior, in size, to the sun himself? Their prodigious distance causes them to appear as brilliant points sparkling in the sky; but, in reality, they are so many suns, the immense circumference of which cannot be measured. With the naked eye we behold innumerable celestial bodies when the absence of the sun in the night permits us to see them shine. But how many more do we discover by the aid of telescopes! It is also probable, that there are many out of the reach of our best glasses. We may venture to assert, that many thousands of suns and worlds roll in the firmament, and that our solar system is but the smallest part of that great multitude which

is ranged above us in such beautiful order. To a contemplative mind, however, the sky presents still greater wonders. These bodies are in a state of perpetual motion, which is subject to invariable laws. They all turn on their own axes, and most of them also revolve in immense circles, round other globes. One particular path is appointed for each of them, whence it never deviates. They run their career with a rapidity that surpasses all imagination. They have a power by which they fly from the centre of their orbit, and yet an equal force retains them within it. Though so many thousands of bodies roll in the same space, they never strike against, or incommode each other. Those stars which appear to us confusedly spread in the firmament, are, on the contrary, placed in the greatest order and the most perfect harmony. For thousands of years they have risen and set regularly in the same manner; and astronomers can foretel their position and their course with the utmost precision. What new subjects of admiration should we have if we were better acquainted with those innumerable globes! But we know little except the system of which our earth makes a part, and of which the sun is in a manner the monarch.

Who can look up and contemplate the sky, without being struck with astonishment at the idea of the great Being who framed such magnificent works! Let our admiration lead us to humble ourselves before him, to adore and glorify him. And when we reflect how poor and

imperfect our homage is, let us comfort ourselves with the thought of that happy revolution we shall one day experience, when the nearer contemplation of the wonders we now see but obscurely, will make our hearts overflow with gratitude and joy.

## AUGUST XXVIII.

### *Moral reflections on a Corn Field.*

THIS field was lately exposed to great danger: impetuous winds whistled round it, and the storm often threatened to beat down and destroy the wheat. But Providence has hitherto preserved it. It is thus that the storms of affliction often threaten to overwhelm us. But these very tempests are necessary to purify the mind, and to root out the tares of vice. In the midst of trouble and sorrow, our knowledge, faith, and humility, increase and strengthen. It is true, that, like the weak ear of corn, we sometimes bend, and are bowed down to the ground; but the merciful hand of our Father supports and raises us up again.

Towards harvest-time the corn ripens fast; the dew, the heat of the sun, and the rain, all combining to hasten its maturity. Oh! may we daily ripen for heaven! May all the events of our lives lead to that salutary end! Whatever our situation may be here below; whether the sun of prosperity shine upon us, or

our sky be overcast by the clouds of adversity; whether our days be gloomy or serene, may all concur to increase our piety and dispose us for eternity!

It is very remarkable, that those stalks which support the largest and fullest ears, differ considerably in height from those that are poor and thin. The latter stand erect, and overlook the whole field; whereas the others bend under their own weight. Behold the emblem of two sorts of Christians! The vain and presumptuous, who have but little religion, set themselves above others, and look with contempt on the truly righteous. A foolish presumption blinds them, and causes them to despise the means of salvation. Those, on the contrary, who are rich in virtue and good works, humbly bend down like the well-filled ears of corn.

How many tares and weeds are mixed with the corn! Such is the situation of a Christian in this world. There is observable in him a mixture of good and bad qualities, and his corrupted nature, like the tares, often interrupts the progress of virtue. A field of corn is not only the image of one individual, but also of the church in general. The profane and the wicked, often, by their bad example, sow tares in a field where there ought to be nothing but good seed. The great Lord of the field permits the tares to remain for a season; he exercises patience and forbearance; and it will not be till the time of harvest in the great day of retribution, that he will give free course to his justice.

Behold with what eagerness the country people run to gather the fruits of the earth! The sickle levels all before them. Thus death sweeps all away, the high and the low, the saint and the sinner. But what are those shouts in the fields? They are exclamations of joy and gladness, at the sight of a plentiful harvest. Let them be also shouts of praise and thanksgiving for the goodness of God, from whom proceeds every blessing. But how joyful shall we be in the great day of harvest! With what ineffable sentiments will our hearts overflow, when we shall meet in the blessed society of angels! Then shall we gratefully recollect our past labours and sufferings, the dangers and storms we had experienced, and we shall raise our voices, with one accord, to bless the beneficent Father who watched over us. Let this pleasing hope support us in the time of trouble: let it comfort us in our sorrow, and teach us to wait with patience for the day of harvest.

## AUGUST XXIX.

### *Shell-Fish.*

Shell-fish, or testaceous animals, are extremely numerous. They live in houses of a substance more or less calcareous, which may be considered as their bones. Their shells are either univalve, that is to say, in one piece; or bivalve or multivalve, that is, of two or several pieces.

They form two large families: the *muscle*, the shell of which is in several pieces, and the *snail*, whose shell is in one piece, and generally spiral. The construction of the former is much more simple than that of the latter. Muscles have neither head, horns, nor jaws; there can only be distinguished in them a wind-pipe, a mouth, and sometimes a sort of foot. Most snails, on the contrary, have a head, horns, eyes, &c.

Great variety is observable among shell-fish with respect to their mode of generation. In some the sex may be discovered; some are hermaphrodites, and others seem to be of no sex. Some are oviparous, others viviparous. They are born with their shells upon them; and, in proportion as they grow, the shell, the inner partition of which is lined with a very fine membrane, grows also; not only in thickness, by layers or leaves one over another, but in circumference, as the circumvolutions, or spires, multiply more and more. The shells are formed by a viscous liquid which exudes from the animal, and which thickens and grows hard by degrees. But whether the shells grow by an exterior juxtaposition, or by a common inward nourishment, has not been absolutely determined. It is most probable, however, that it is by the former means. Most shell-fish live in water, and particularly in the sea: sometimes near the shore, and sometimes in the main ocean. Some are carnivorous; others feed on plants. Some stay at the bottom of the sea, or adhere to rocks, and remain motionless. Oysters, and other animals with hard shells,

fasten themselves to different bodies, by means of a glutinous gritty liquor; and are often heaped and fastened upon each other. This adhesion is voluntary in some shell-fish, which cling to any thing, as circumstances require; but it is involuntary in others, which always remain immoveable on the rocks to which they are fastened.

The knowledge we have of these animals is still very imperfect. As they mostly live in the bottom of the water, it is very difficult to make exact observations on their formation, mode of life, food, propagation, and motions: and at present only three or four classes of them are known: but it is extremely probable that hundreds of others might be discovered, could we carry our researches to the depths of the sea, and the bottom of rivers. Hitherto we have scarcely attended to any thing but the beautiful forms and colours of the shells, while the true construction and manner of life of the animals that live in them, are still little known, and we are scarcely acquainted with the purpose of their existence. But even these, as far as we know of them, are subjects sufficient to lead us to admire the infinite greatness of God. We every where find creatures which, each in its way, bear the impression of the majesty of the Lord. To be convinced of this truth, we need only look into the cabinets of shells that are collected, and there observe the prodigious variety in their size, form, and colours. Here the hand of God visibly shows itself; and every thing convinces us,

that all his designs are worthy of his wisdom and goodness.

## AUGUST XXX.

### *On the Government of God.*

A God, who, from his supreme height, could be an indifferent spectator of all the revolutions which take place in this world, would not merit our homage. Happily for us, the government of the Deity whom we adore takes in all his creatures. We every where find the *centre* of his empire, but we no where see its *limits*. All his works are continually before him. At one glance he beholds the past, the present, and the future; and comprehends all their combinations, relations, and dependencies. The least events, the most trifling circumstances, so far from escaping his notice, enter into the plan which he has formed to accomplish his infinitely wise and holy purposes; and these purposes unite and combine to procure for his creatures the highest possible degree of happiness. God takes pleasure in his works; he sees them with one glance, and rules them by a single act of his will. His laws are dictated by wisdom; and his commands are a source of joy and happiness.

God, by his providence, preserves every species of creatures which he formed in the beginning of the world. Animals die, but others come in their place: generations of men pass away, and

others succeed them. The Ruler of the world makes use of inanimate creatures to preserve the living, and to render them happy. And finally he makes them all subject to man, who alone is capable here of knowing his works, and of adoring him.

This God, who is holiness itself, wills that his rational creatures should know and rejoice in the beauty of holiness. By the continual proofs which he gives them of his love of righteousness, and his abhorrence of sin, he speaks to their hearts, and unremittingly exhorts them to walk in the paths of true virtue. To this end he directs their actions, frustrates their designs when they are contrary to his merciful views, and offers them the means of avoiding the road to iniquity. What infinitely wise measures did he use to conduct the children of Israel to the blessed ends he proposed! In vain did the idolatrous nations repeatedly conspire the destruction of a people who marched under the immediate protection of their God, and professed a pure and holy religion, which distinguished them from the blind and superstitious heathen.

The God of our faith dwells in light inaccessible. There is a depth of wisdom in his government which none but himself can fathom. Our understandings are too weak to see through the whole of his plans, or to form a just idea of his views, before the event has discovered them. Our knowledge is too limited to penetrate into the counsels of an infinitely wise Being, or to discover beforehand the motives of his dispensa-

tions. The wicked man often sits among princes, whilst the righteous is humbled in the dust. Villany triumphs, and integrity is oppressed. Fortune smiles upon the champion of iniquity, whilst the friend of religion experiences disgrace and disappointment. And yet there is a Providence. Yes; notwithstanding all these apparent disorders, the Lord is ever the tender Father of all his creatures; their infinitely wise God, their just and equitable Ruler. He should be adored in all his dispensations, however impenetrable they may appear to us. His counsels are wonderful, and his plans surpass our understanding; but they are always formed and executed with sovereign wisdom. All that happens in this world, and at which we often wonder, tends to the accomplishment of the most excellent designs. The load of affliction and misery under which we groan, may possibly have the happiest effect on our future state. This apparent evil may perhaps be a necessary medicine for the soul, and on this salutary correction, our faith, the purity of our hearts, and our eternal felicity, may in a certain measure depend. Whoever is discontented with his lot, let him consider all these things, and he will cease to murmur. Why, O man! dost thou undertake to fathom the plans on which God governs the world? Thy understanding is limited, and yet thou pretendest to discover the views which the Supreme Being proposes to himself. Thou canst not comprehend the connexion of those things which pass under thy immediate notice: thou knowest not what has preceded, or

what is to follow; and yet thou hast the presumption to judge of causes and effects. Providence is just in all its plans, and all its dispensations. It is true, that thou canst not always see the motives of the Creator's conduct; but to be able to comprehend these, thou must be what God is.

## AUGUST XXXI.

### *Harvest Hymn.*

Our fields crowned with fruits and ears of corn, are a hymn to the Lord. The joy that sparkles in the eyes of the reaper, is a hymn to the God of nature, who causes bread to spring out of the earth, and who loads us with his blessings. Let us assemble and sing unto our God, and let his praise be the continual subject of our songs. Let us listen to the glad voice which rises from the bosom of our fields. "The year shall crown thee with its blessings, O world! whose happiness is my work. I have called forth the spring, and produced the rich autumnal harvest; the fields by which thou art supported, and the little hills covered with corn, are mine." Yes, Lord, we behold thy greatness, and we feel the value of thy favours. It is through thee that we exist: life and food are the gifts of thy hands. Blessed be the fields that nourish man! Flourish ye beautiful meadows! Be covered with thick foliage, ye magnificent forests. And thou, O God of nature, be ever beneficent towards us!

Then, from morn to night, will the Lord be the object of our praise. Free from cares, we will rejoice in his blessings; and our children shall repeat after us: "The God of heaven is our Father; the Lord, the Almighty Jehovah, is our God."

END OF THE SECOND VOLUME.

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